Infantry School Quarterly

UNIVERSITY OF MICHIGAN LIBRARY JAN 22 1948

Formerly
The Mailing List

Published by
The Infantry School
Fort Benning, Ga.

January 1948
Vol. XXXII No. 1

INFANTRY SCHOOL QUARTERLY

A compilation of instructional matter prepared at The Infantry School and published quarterly

Containing the Latest Thought on Infantry

Volume XXXII, Number 1

Prepared by the Academic Department of The Infantry School by direction of Major General John W. O'Daniel, Commandant, and under the supervision of Brigadier General W. P. Shepard, Assistant Commandant

DISTRIBUTED BY THE BOOK DEPARTMENT
THE INFANTRY SCHOOL, FORT BENNING, GEORGIA

SIG 1

BOARD OF REVIEW

Colonel Lloyd D. Brown ..... Coordinator
Colonel Bernard A. Byrne ..... Asst Coordinator
Colonel Burton L. Lucas ..... Weapons
Colonel Fay Ross ..... General Subjects
Colonel Douglas Sugg ..... Tactics
Colonel Roy E. Lindquist ..... Airborne

DIRECTOR OF PUBLICATION

Colonel Charles E. Beauchamp

EDITOR

Major William D. McDowell

CONTRIBUTORS

Articles for this issue were prepared by the following personnel:

Colonel Aubrey D. Smith, *Infantry*
Lieutenant Colonel Lyle W. Bernard, *Infantry*
Lieutenant Colonel William B. Means, *Infantry*
Lieutenant Colonel Angel A. Cardona, *Medical Corps*
Lieutenant Colonel Elmer Schmierer, *Infantry*
Lieutenant Colonel Howard D. Balliett, *Infantry*
Major William R. Lynch, Jr., *Infantry*
Major Carroll McFalls, Jr., *Infantry*
Captain Samuel V. Wilson, *Infantry*

Technical Sergeant James F. Quinn served as editorial assistant and staff photographer. Original art work was prepared by Technical Sergeant Willie R. Wright, Technical Sergeant Michael E. Gonfriddo, Sergeant Gilbert L. Johnston, Sergeant Weona P. Wright, Sergeant John Aguilar, and Private First Class Wilburn C. Hartley.

DIRECTOR OF PRINTING

Lieutenant Colonel Albert C. Haley

The printing and binding was accomplished by the enlisted personnel of the Army Field Printing Plant, Fort Benning, Georgia.

TABLE OF CONTENTS

January 1948

	Page
Considerations Governing Offensive Combat in Mountains	5
Tall Oaks from Little Acorns Grow	22
Adjustment of Observed Fires	33
Movement of an Infantry Regiment by Motor	58
Personnel Adjustment—A Command Function	78
The Heavy Mortar Company in Defensive Combat	92
Tactics and Techniques of Small-Unit Fighting in Built-Up Areas	111
Duties of a Division G-4	124
Merrill's Marauders (An Historical Monograph)	143

RESTRICTED: For sale to military personnel only.

Published in January, April, July, and October by The Infantry School, Fort Benning, Ga. Applications for subscription must state military status of the applicant, be accompanied by check or money order for $2.50 (for four issues), and be addressed to the Book Department, The Infantry School, Fort Benning, Ga.

1436928

16440 FT. BENNING, GA. 25 SEP 47 3500

Considerations Governing Offensive Combat in Mountains

Mountain warfare, although by no means new, is the object of newly awakened interest and intensive study in the peacetime military preparedness program of the United States Army. Although only a relatively small proportion of any representative group of Americans grew up in a mountainous area, experience has taught that a knowledge of the nature and technique of living, moving, and fighting in the mountains has become a necessary educational requirement for every professional soldier.

Probabilities of engaging in mountain operations are by no means remote. Approximately one-third of the earth's land surface is classed as mountainous. In general, a mountain is any height of land that rises abruptly 1,000 feet or more above the surrounding terrain. This definition includes terrain that inhabitants of the Western States would call merely small hills, up to the lofty Alpine peaks that are covered with snow and ice the year around.

Broadly speaking, mountains are called Alpine when they rise above the timberline—a line of demarcation that varies greatly in various parts of the world. Timberline in the Swiss Alps is at 7,000 feet; in the Colorado Rockies it is at 11,500 feet. Alpine combat is a special operation, requiring special clothing and equipment and special training for survival under conditions of extreme exposure and extreme difficulty of movement. However, combat in ordinary mountains will be more generally encountered by troops who have not been organized, trained, and equipped for Alpine combat. Rather than limit this discussion to *extreme* conditions the principles of offensive action in all types of mountain terrain will be discussed in general terms. It is recognized, however, that high altitudes, heavy winter weather, and

tropical or desert climates impose special conditions that must be considered in applying the principles to a particular mountain operation.

HISTORICAL BACKGROUND

It is not necessary to enumerate the many important mountain ranges throughout the world. It is only necessary to think for a moment to recall how often mountains form the frontiers of countries, and how often they have figured strategically in the course of history and the rise and fall of empires. In 218 B.C., Hannibal led an army of Carthaginians over the Alps from what is now France and won a great strategic victory over the Romans in northern Italy. In the year 480, King Leonidas and 300 Greek soldiers held off an entire Persian Army at the pass of Thermopylae. Medieval as well as modern history is replete with examples of wars waged in mountainous areas.

In World War I, the campaigns on the Eastern Front were fought in the Alps, Carpathian, and Balkan mountains. A classic World War I example of a mountain operation is the Battle of Caporetto, where the Germans and Austrians attacked the Italian forces in Venezia in the southern Alps on 24 October 1917. Crack Alpine troops maneuvered up to 6,500 feet in snow, mist, and rain to outflank and surprise the Italian defenders and administer a staggering Allied defeat.

The United States did not fight on the Eastern Front in World War I and hence had no experience in mountain combat. As a result, mountain operations generally were treated as an academic subject in the U. S. Army until very recently.[1] Even while preparing for World War II, most troops trained on the rolling terrain characteristic of most army posts.

---

[1]A noteworthy exception to this point of view was evidenced in the annual maneuvers conducted in Hawaii in the 1930's. The Hawaiian Department regarded mountains as "difficult terrain" and considered positions in mountainous areas as "obstacles." The concept of "impassable terrain" was bluntly denied in the defensive doctrine promulgated by the Department.

Then World War II brought some startling developments. In 1939-40, the Finns, veterans of winter mountain warfare for centuries, greatly outclassed a much larger Russian Army. In 1940, the Germans suddenly exploded the "impassable obstacle" concept by passing large armored forces through the rugged, hilly Ardennes in a fast end-run of the Maginot Line. They also successfully invaded the mountainous Balkan countries and Norway. The next year, United States forces learned that even the jungle-covered mountains of Bataan were no barrier to an aggressive attacker.

Bataan was only a brief introduction to participation of U.S. troops in mountain campaigns in this war. American soldiers fought in the jungle-covered mountains of New Guinea, Burma, and Luzon. They fought in the bare, rocky mountains of Tunisia, Sicily, and Italy. They fought in the cold, windswept mountains of the Aleutians. They fought in the heavily timbered mountains of Alsace and Germany. Great difficulties were experienced initially in adapting ground forces to mountain conditions, but eventually, operations in all of these areas were successful. The lessons learned in these campaigns are now a part of military doctrine.

The 10th Mountain Division, which fought magnificently in Italy, has been inactivated. Whether any special mountain divisions will again be activated in the U.S. Army is open to speculation, but the present Army Ground Forces policy requires *all* infantry divisions to have a degree of training that will permit their rapid conversion for—among other things—mountain operations.

CONSIDERATIONS AFFECTING TACTICS

Physical factors. The purpose of this article is to consider tactics in mountain warfare, but to do this intelligently the physical nature of the problem must first be analyzed. Three general factors—terrain, weather, and altitude—each present particular problems that will affect troops and operations.

Mountainous terrain is rough and uneven, consisting of exaggerated hills and valleys with steep slopes. The terrain

is split up into compartments, separated from each other by obstacles that frequently are formidable. Passage from one compartment to another is through such defiles as narrow valleys, passes, or saddles. The slopes may be covered with great masses of broken rocks (talus), loose gravel (scree), heavy woods or jungles, or snow and ice, depending on the altitude, season of the year, latitude of the region, and geologic history of the mountain formation. Mountain areas usually are sparsely inhabited; there are few roads and trails and those in existence are usually narrow, winding, and of poor quality.

Mountain weather is more extreme and inclement than the climate near sea level. Strong winds blow through the passes; sudden, violent storms accompanied by rain, sleet, or snow occur frequently near the peaks. In milder form, these atmospheric disturbances cause thick clouds or heavy mists to form, obscuring the terrain. Avalanches—particularly in the spring of the year, between the hours of 1000 and 1600 when the sun loosens the snow—are a common and dangerous threat.

High altitudes are responsible for the more unusual climatic conditions. The "thin" rarified atmosphere absorbs less heat from the sun's rays, and therefore is colder. The temperature drops about two degrees for each 1,000 feet increase in altitude, up to 36,000 feet. At 10,000 feet above sea level, this amounts to a drop of 20 degrees. However, since the thin air allows solar radiation to pass through it so readily, at cloud level men may find themselves uncomfortably warm and practically blinded by the strong sunlight during daytime, then bitterly cold at night. The barometric pressure at 10,000 feet is so low that water boils at 180 degrees F, and it requires six minutes to cook a "three-minute" egg.

Conditioning of personnel. Human beings experience greater difficulty existing in the mountains, principally because of exposure to wind and cold. In addition, fatigue is greatly increased in mountains because the rarified air

makes breathing more difficult, and the necessity for climbing up and down steep slopes requires greater physical exertion. Because the "thin" air supplies less oxygen to lungs, acclimatization is sometimes necessary before an individual can breathe comfortably at high altitudes. The discomfort experienced, when it is acute, is called "mountain sickness." However, this condition is rare except at high altitudes, and even then it usually disappears after a few days. The normal individual will soon enjoy the exhilarating mountain air.

Physical condition of individuals must be excellent to offset fatigue in mountains. A 200-pound soldier may march all day on level ground and do less than 100,000 foot-pounds of work. This same soldier, in climbing 1,000 feet, will accomplish 200,000 foot-pounds of work. To avoid extreme exhaustion under these conditions soldiers need three things: a proper diet, physical conditioning, and training in technique of movement.

The diet of mountain troops must be high in energy-building foods. Standard military rations have been found satisfactory in this respect. However, since digestion is slower at high altitudes, four or five light meals per day are more desirable than three heavy meals.

Progressive physical training can be combined with training in the proper technique of moving over rough ground. Untrained men quickly tire themselves out when climbing, by resting all their weight on the balls of their feet, keeping the calf muscles tense, and by frequent slipping and struggling to keep their balance. Mountain walking is much less tiring if the feet are kept flat against the ground, the weight of the body forward, and the knees are locked with each step as in normal walking. This technique can be learned with a little practice. Men must learn to *traverse* steep slopes, instead of heading straight up or straight down, and they must understand that it frequently is more dangerous to descend than to climb. Proper adjustment of packs and equipment is also important. Although it is generally agreed that a man should carry no more than 45 pounds of equipment in mountains, this theoretical limit

frequently must be exceeded, since extra clothing and shelter are required for protection at night. If such equipment is to be available when needed, usually it must be carried on the back of the user.

Selection of proper cross-country routes can do much to conserve strength of troops. Travel along a ridge line is satisfactory, unless it is sharp and broken. Valley bottoms are usually full of obstacles, such as marshy ground, steep cuts, heavy woods, and rocky stream beds. In tropical mountains, deep ravine bottoms are subject to such sudden flooding during cloudbursts that troops employing them as a route may be trapped and drowned by onrushing water. The best route usually will be somewhere along the slope, following the contours.

Psychological adjustment of individuals also requires consideration. Many people who have never lived in mountains have erroneous ideas and instinctive fears that must be overcome. They may think the altitude is harmful to their health, and they may be afraid of heights. Adjustment is usually a natural process as they become familiar with their mountain surroundings.

MILITARY FACTORS

Each of the physical characteristics of mountain operations exerts a definite influence on military tactics. Observation, firepower, cover and concealment, mobility, communication, and supply and evacuation must be re-evaluated in terms of their adaptability to the particular situation. For example, heights and valleys greatly increase the powers of ground observation, and the man on the highest ground has a distinct advantage. The Germans, for example, who looked down from the heights above Anzio had such excellent observation that they prevented nearly all daylight movement and drove nearly all Allied beachhead installations underground. Mountain heights offer another advantage in that sounds carry distinctly up from the surrounding valleys. A man's voice may be heard 3,000 feet above.

Because of these advantages observation posts must be used extensively and in greater numbers than in normal terrain. They should be echeloned in altitude as well as in width and depth, because constantly shifting currents of warm or cold air produce sudden atmospheric changes, so that little reliance can be placed on the visibility at any one OP. In this connection it should be noted that sound-ranging is difficult in mountains, because echoes are deceptive and the waves are diminished rapidly by steep ridges.

Firepower. Just as high ground provides good observation, so does it also provide long fields of fire with excellent opportunities to employ overhead fire. However, broken ground causes a net *reduction in fire-effect.* Also, firepower is frequently reduced as a result of the difficulty of moving weapons and ammunition into effective positions. Flat-trajectory fires are usually plunging instead of grazing, danger spaces are short, beaten zones of automatic weapons are small, and an excessive amount of dead-space exists.

In mountain combat the technique of indirect fire is complicated. Vertical control, which artillerymen call "site," is important in computing the angle of elevation if the target is at a higher or lower elevation than the guns. Unlike normal terrain where artillery seeks the most defilade available, in mountains, artillery is impeded by *too much* defilade. As a result, guns are easily masked, preventing fire at closer ranges, and guns must be positioned on or near a hilltop to overcome this disadvantage. Under these conditions, adjustment of fire on hilltops and in the bottoms of narrow valleys can be very confusing to the inexperienced forward observer. The problem is illustrated in Figure 1: In firing on a target at A, slight corrections for range may cause some rounds which barely clear the crest, to land out of sight well beyond the target. Reversing the situation, if friendly troops are at A and the target is at B, caution must be exercised that a slight reduction does not cause a round to fall among friendly troops. Often the creeping method of adjustment must be substituted for bracketing.

Because of these factors, high angle fire is usually most effective in mountains. Thus mortars and howitzers prove more effective than high-velocity, large caliber weapons.

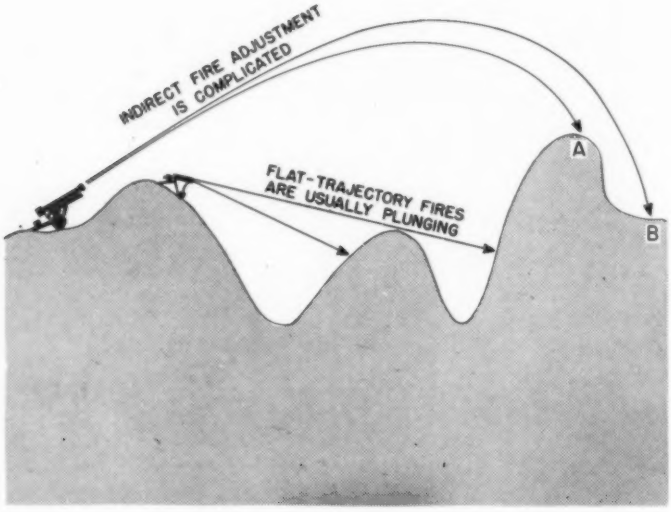


FIGURE 1.

Cover and concealment. Since broken ground hinders observation and fire, it also affords concealment and cover. The excessive dead space in the fields of fire of flat-trajectory weapons permits maneuver in defiladed areas, even within a few yards of the defended battle position. The defender faces the problem of finding positions in depth from which he can fire on the attacking troops before the forward elements of the position have been assaulted and destroyed. Often the defender will organize the reverse slope in order to be able to support the forward defense area from the next hill back. Thus, when the attacking troops reach the crest in front of the reverse slope position, they will come under fire just as they lose their own support from direct-fire weapons. Sometimes it may be necessary

for the attacker to overcome the supporting position first, moving around the forward position by a covered route. Concealment is effected by taking advantage of deep defilade, the cover afforded by vegetation, camouflage, and the use of smoke on known or suspected enemy observation posts.

Mobility. Mountainous terrain retards mobility. Lack of existing routes restricts movement; seldom can a force be moved over several parallel routes, but instead, must be strung out to great length over a single route. Construction of new trails is slow and difficult. It is easy for the defender to retard the attacker by blowing bridges, blasting out sections of the road along a steep slope, or blocking a defile with a slide of snow, rocks, or timber. Frequently all vehicles will be stopped by such barriers, and only foot troops will be able to continue the advance.

The rate of march of foot soldiers is decreased greatly, even on roads that wind up and down the slopes. On a good trail, clear of snow, foot troops require an additional hour for each 1,000 feet of ascent and one hour for each 1,500 feet of descent. For example, to march a company 10 miles over a road that rises over a 3,000-foot pass and descends again to the same altitude will require nine hours—more than twice the normal four hours required on level terrain.

As a result, the conception of *supporting distance* must be modified in the mountains. The map distance between two points may be relatively short, but the time required to move from one point to the other on the ground may be many hours, or even days.

Supply and evacuation. A workable supply and evacuation plan is a necessary requisite to conducting a successful campaign in any area. Even on level terrain, the availability of lines of communication determines the ability of a force to initiate and carry on a sustained action. Unless the materiel expended during the advance is replaced, the unit will be forced to halt until the supply lines catch up. This is especially true of mountain combat where road nets frequently consist of a single track passable only to small vehicles. Consequently, it may be necessary for the unit commander to modify normal supply procedures to insure that

the problem posed to the supply echelon is not insurmountable. For example, ¼-ton trucks may be used in lieu of larger vehicles when an adequate two-way road net does not exist. In extreme cases it may even be necessary to move supplies to a jeep head, transload them on pack animals and move them to a mule head, and make the final leg of the supply mission by hand carry. This procedure was actually used on numerous occasions by mountain troops employed in Italy. Another solution is to arrange for periodic supply drops by air. This method, however, is not usually sufficient in itself. Frequently enemy air activity, lack of cargo aircraft, weather, or the rugged terrain will make air drops impractical.

Evacuation may be carried out by increased use of light vehicles, pack animals, and manpower. Dismounted medical parties may have to establish advance aid stations for treatment of the sick and wounded during the slow process of moving them to the rear. The problem is further complicated because a smaller proportion of the wounded will be able to walk over the rough ground, and two to ten times as many litter bearers are required to move a single casualty over very rough terrain. In addition, evacuation will be slower than normal, increasing exposure and the danger of shock.

Communication. Mountainous terrain has an adverse effect on wire and radio communication. Communication of any sort is difficult in mountains. Scarcity of roads limits the use of wire-laying vehicles thus forcing wire-laying parties to man-handle the heavy reels up steep slopes, over rocks, or through dense undergrowth. Messengers travel slowly and easily become lost. Radios, especially high-frequency sets, may not work satisfactorily if there are large hill masses between them and the sending sets, thus requiring several relay stations. Static electricity in cold, dry air may interfere with the operation of communication equipment, so that radio antennae and switchboards must be grounded. Visual signalling devices, however, can be used very effectively between mountain heights.

Maps. One characteristic of mountainous areas that is of military significance deserves mention here: Such areas generally are poorly mapped because lack of population and travel in mountains results in scant attention being paid to mapping projects in peacetime. Consequently, map data should not be trusted; it must be verified on the ground. The best means of obtaining terrain information is, of course, ground reconnaisance since it will produce detailed information unobtainable from the air or even from a good observation post. Visual or photo reconnaissance is used extensively, however, because it can be rapidly accomplished and is comparatively simple. The user must keep in mind, however, that although a selected route may look good on an aerial photo, it may prove to be impassable when checked by a ground patrol. Patrolling by well-trained soldiers can be tremendously effective in overcoming these disadvantages since the broken ground affords an excellent opportunity to move close to, or even into, the hostile position without being detected.

TACTICAL CONSIDERATIONS

As in operations on normal terrain, victory in mountain combat can be gained only by adoption of the offensive; the most that can be gained from a well-conducted defense is time, and if the time thus gained is not utilized to prepare for the defensive, even it is of no avail. Consequently, although the defender may have the advantage of superior observation, position, and communications, these temporary advantages are methodically dispelled by an aggressive adversary.

From the tactical standpoint, combat in mountainous terrain offers no new considerations. The principles of war do not change. The manner of application of some of the principles, however, may, of necessity, be altered to best conform to the special situation and the limitations imposed by the terrain and weather.

Objectives. An evaluation of mountainous terrain indicates that the critical features are the roads, ridges or heights, and the defiles. Since the road net will probably

be limited, the few existing roads will have great tactical importance. A battalion, or even a regiment, may operate off the roads for a limited time, but a sustained advance by any considerable force requires a suitable line of communications. Therefore, a road is usually selected as the main axis of advance. In mountains, the roads are nearly always in the valleys and pass through defiles. To use the road it is necessary to control the defiles. Since valleys and defiles are dominated by the heights on either side, it is first necessary to gain control of the heights. By the same token, to advance along a valley, it is first necessary to seize the ridges on both sides; to attack across a valley, it is necessary first to secure control of the far ridge, using tactics similar to those employed when forcing a river crossing. Therefore, it is clear that almost invaribly the tactical objectives will be the commanding high ground.

Maneuver. Although mobility is retarded, the basis of mountain warfare is maneuver. The most difficult route may provide the most successful surprise and flanking action. This requires that a force be capable of maneuver in rough terrain; inability of an attacking force to deploy from the roads will permit a much smaller defending force to stop the advance in front of the first defile.

Maneuver to control the heights will probably require dispersion of the force initially, although, in a sound plan, the various elements will ultimately converge on a final objective. This dispersion, coupled with restricted mobility, will tend to cause the battle to develop into several more or less isolated conflicts.

Decentralization of command. Although unity of effort is maintained by assigning missions in furtherance of the commander's over-all plan, frequently it will become necessary to decentralize control to a large degree, relying more and more upon the initiative and ability of subordinate commanders, and requiring greater self-sufficiency in each unit. A typical situation is shown in schematic form in figure 2.

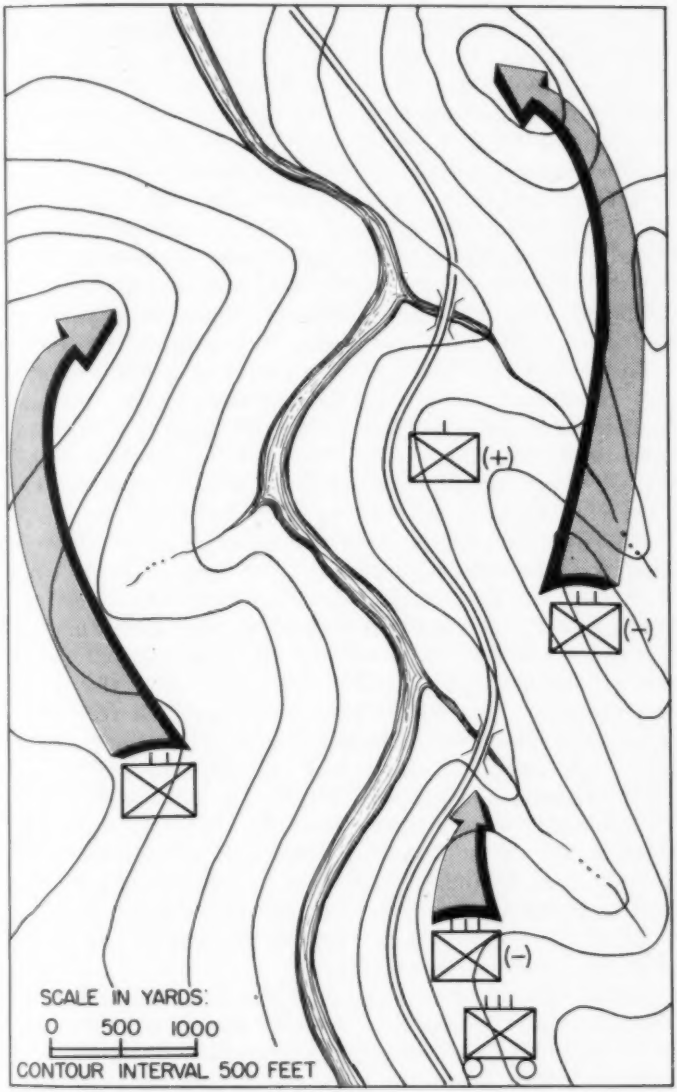


FIGURE 2.—Mountainous terrain frequently makes it necessary to decentralize control of subordinate units.

A regiment advancing along a road that follows a river valley must pass through a defile, bounded by heights controlled by the enemy. To move along the road, the regiment must seize this dominating ground. One battalion is advancing along the ridge on the left; another battalion, less a company, is making a wide movement to the right to avoid frontal attack against the ridge which is its objective. A rifle company will secure an intervening hill. Clearly, the regimental commander must decentralize control under these circumstances; it is also obvious that the commander of the right battalion cannot exercise *close control* over the company moving to a separate objective.

Formations and frontages can not be prescribed by any rule of thumb; they must be adapted to the terrain. Neither do boundaries have much significance, except between units working closely together on the same terrain feature. Consequently, control is exercised by prescribing a route of advance or a series of objectives to be taken.

Security. During the approach march, the problem of security is greately accentuated. The long columns, slow movement, and canalization of the force gives the defender an opportunity to prepare an ambush or trap. A unit may be required to advance up a narrow, winding trail that cuts back so sharply that situations will arise where the point, well ahead on the trail, is only a few hundred feet from and directly above the main body. A surprise attack at this time might engage the main body simultaneously with the advance guard, and prevent entirely any deployment from the vulnerable column formation. To offset the increased vulnerability of an attacking force, patrols and outposts must be sent to the *high ground* to secure the advance. Continued and efficient reconnaissance is essential in order to locate the enemy and to find the best routes for movement into position to attack.

Attack. Having found the enemy and located his positions, he must be engaged. Frontal attack into the zone of the enemy's best observation and field of fire is, of course, avoided whenever possible. Attack in mountains

usually takes the form of a close-in envelopment—a solution that is again dictated by the terrain. (Wide envelopments or turning movements, although they might be most decisive if executed, are usually ruled out for the simple reason that such a maneuver would completely exhaust the troops and render them incapable of fighting, or, at best, it would take so long to complete that it could not achieve a decision in time to further the over-all plan. There are notable historical exceptions, but they occurred when time was of secondary importance.) Envelopment and capture of one hostile position on a key terrain feature may, in itself, outflank other hostile positions. Thus the defender's problems in organizing mutually supporting positions may provide opportunity to defeat him in detail.

Reserves can not be shifted rapidly during the attack to exploit local successes as they occur, when time and space limitations are great. For example, if it takes 12 hours to move a reserve battalion to a position in contact with an attacking battalion, either the reserve must be started moving to the critical area long before it is needed, or it must be mutually understood that it will not—can not—be available to assist. Because of the increased importance of the time element, units are reinforced to increase their self-sufficiency, and the commander must plan in greater detail for the probable use of his reserve.

Surprise. Excellent opportunities exist for gaining tactical surprise in the attack as the defilade afforded by the terrain can completely screen the movement of large units. When hostile observation precludes gaining surprise by utilization of defilade, night movements and night attacks can be particularly effective in mountains. Of course, the same difficulties must be overcome that are inherent to a night attack in any terrain, but prominent terrain features provide good landmarks for control, and a ridge or a stream line can be utilized that leads to the desired objective. In the mountain fighting in Italy, American troops attacked successfully at night across bare, rough terrain where progress was very slow and where they would have been subjected to devastating enemy fire in daylight.

Pursuit. Pursuit of a withdrawing or delaying enemy through mountainous terrain requires the maximum physical exertion and stamina. The enemy can easily place obstacles in the path of the pursuer. Encirclement is seldom possible, except by airborne units. Pursuit in mountains assumes the character of frontal pressure, aggressively maintained, while air and artillery support are used to the maximum to create delay along the route of withdrawal. Defiles along the route are bombed or interdicted in the hope that pursuing infantry can engage the main body of withdrawing troops in front of the defile and destroy it.

EMPLOYMENT OF SUPPORTING ARMS

All of the supporting arms and services can successfully perform their missions in mountain warfare, despite the limitations imposed by terrain and weather. The *quantity* of artillery fire available may decline, because of difficulty in supplying ammunition and in finding roads capable of sustaining the movement of the heavier caliber guns. However, pack and truck-drawn light howitzers have repeatedly proven to be most effective in mountains because of their mobility and ability to deliver high-angle fire.

Armor is restricted by mountain terrain, losing much of its mobility and consequently, ability to maneuver. Tanks can, however, deliver effective direct fire support. Because of limitations imposed by the terrain, tanks are most frequently employed in small units against limited objectives.

Engineers are an indispensable supporting arm in mountainous terrain. Consequently, a larger than normal proportion of a force operating in mountains should be engineer troops, in order to provide men and equipment to maintain or prepare supply routes and remove obstacles that impede the advance.

Combat aviation is best used to disrupt the hostile line of communication. However, unfavorable weather conditions frequently curtail use of the air arm. Reconnaissance aircraft can be of great assistance to the ground force by

making it possible to obtain visual observation into defiladed areas and performing aerial photography. When required, aircraft may be used to drop supplies to isolated units, or to maintain contact with them.

THE ROLE OF INFANTRY

Infantry, having the mobility and self-sufficiency to overcome even the most difficult obstacles of the terrain, plays the dominant role in mountain fighting. It is not in itself bound to the roads. It has great flexibility in the use of its own weapons. Infantry is capable of increased maneuver at close range to the enemy, to offset the reduction in firepower and limitation of fire support.

Control of the heights is the key to success in mountain warfare. Rifle units—who do the fighting on foot—are in mountain combat the higher commander's only means for *seizing and holding the high ground* and maneuvering to close with the enemy. Infantry soldiers, with their portable weapons, combining the tactics and technique of fire and maneuver that hold true in combat in any type of terrain, with superior physical stamina and a knowledge of how to move and survive in mountains, can close with the enemy regardless of the terrain.

Tall Oaks From Little Acorns Grow

The Army needs ideas. Like big business which thrives on the influx of new thought and new ideas, the Army can not afford to remain stagnant during times of peace. Maintenance of the *status quo* results in thinking of the Maginot Line type; the ultimate result is recession, deterioration, and defeat.

Realizing that all ideas which contribute to the improvement of infantry weapons, equipment, tactics, and technique do not originate at the top level, the Infantry School Requirements Board has been established to serve as a sounding board for basic ideas which originate at the level of the using arm or service. Throughout the preparation for and prosecution of World War II, many ideas were formulated which eventually brought about changes in equipment, tactics, and armament of infantry units. Many of these ideas originated with enlisted men and junior officers—men who were actually using the equipment, armament, and tactical doctrine against the enemy.

Many other ideas were formulated but due to the exigencies of combat, were laid aside or forgotten for various reasons. Others were tested and found inadequate. Some were found to be appropriate but for economic and military reasons could not be put into effect while the war was in progress. Now is the time to re-examine these dormant ideas to determine their merit in the light of a recently reorganized army—to examine them without regard to military, economic, and time limitations.

Idea may be the wrong term to use in this connection because it sometimes denotes complete continuity of thought culminating in a rational solution. Ideas conforming to this criteria are naturally few in number and seldom originate with an individual. Actually, what the Army is looking for

is directed, rational thought on indigenous problems. The solution need not be apparent to the thinker—a problem without a solution frequently results in improvement or stimulates another person to arrive at a near solution.

Problems affecting its personnel are of deep concern to the Army and are also included within the broad term, "ideas." Naturally certain problems arise at all command and administrative levels. As long as they remain unsolved, they create certain inefficiencies in utilization of manpower or materiel. Problems of this nature must be brought to light and examined with a view to dissolving them or at least lessening their intensity and effect.

Agencies are available on all levels to examine, evaluate, and develop original thought thus insuring the maximum benefit to the military establishment as a whole and effecting the maximum economy of time and money. The machinery, organization, and function of the President's Scientific Research Board, which is the top-level agency, is beyond the scope of this article. Its purpose, generally, is to direct tests, experiments, and research which are beyond the capabilities of the lower echelons of research and development. In addition, it coordinates the activities of Army, Air Force, and Navy to prevent duplication of effort and effect the maximum economy. It also coordinates industrial, institutional, and military research to obtain the optimum results.

Counterparts of this top-level agency also exist on intermediate command levels. The Army Ground Forces Test Boards (four in number) are equipped to perform basic research and development on equipment and armament for the Ground Forces. Each of the Technical Services has a Research and Developments Section which concerns itself with basic research in a particular field. Research and Development units on this level function under the Commanding General, Army Ground Forces or the Commanding General of the Technical Service concerned but also maintain liaison with the Director of Service, Supply, and Procurement and Director of Research and Development. Such units are equipped with laboratories, field and test stations, proving

grounds, or schools as required and frequently maintain contact with industrial research laboratories.

The function of the newly-created Infantry School Requirements Board is to collect, evaluate, and interpret ideas and problems and, when library research indicates that a project is of sufficient importance, submit findings through command channels to Headquarters, Army Ground Forces, for further study and physical research. The Infantry School Requirements Board is not designed to make tests, construct test equipment, or make laboratory-type experiments. Rather, they examine each problem by delving into all the written material available on the subject. They exploit the experience and opinions of other individuals and agencies. A full report covering both sides of the subject is drawn up and when circumstances warrant, conclusions and recommendations are appended. If the project is of sufficient importance and research indicates that the idea is feasable, the report is submitted to AGF. The commanding General of Army Ground Forces then determines whether the idea or problem should be submitted to one of the four AGF test boards or other agencies for physical study and development.

All agencies stress the need for clear advanced thinking in changing the old and developing new doctrine, methods, and procedures. Equipment and other material is under constant review and subject to improvement. In addressing the students at The Infantry School, Major General John W. O'Daniel, The Commandant, stated, "What you are taught here has been approved and directed by the War Department. The doctrine and material is modern, progressive, and based on new ideas of warfare as they are formulated and crystalized." This statement emphasizes the determination to keep abreast of the times which permeates the entire Military Establishment.

RESPONSIBILITY FOR PLANNING

After the war extensive studies were made to determine the future needs of the Armed Forces. The Stilwell (War Department) Equipment Board, the Infantry Conference

of 1946, and other similar groups concerned themselves with immediate and long-range requirements. The personnel involved in these studies were representative of the best thinking available. Their conclusions and recommendations were progressive and imaginative. Subsequent implementation of their ideas has tended towards keeping both materiel and doctrine in step with the potential speed of future wars. As new equipment is provided, methods, techniques, and doctrine are modernized to parallel the advances which have been made. There is a consciousness on the part of military personnel that procedures and means can and must be *further improved* in order to maintain them on a level with the expected increased tempo of future warfare. Inventiveness and sound originality are requisites to maintenance of our position as a first-rate military power.

Army personnel are constantly reminded of their responsibility for advanced thinking. War Department Circular 126, 17 May 1947, encourages all *agencies and individuals* to submit statements of military characteristics of any item of materiel which may be utilized to advantage by the Army. Constructive criticism of materiel and techniques is also desired. Persons offering suggestions need not have any idea as to how an item can be produced or formulated; it is sufficient to list the capabilities which the proposal should possess in terms of performance. The Department of the Army particularly desires those suggestions which pertain to the unusual and radical approach to problems. For this reason, projects which appear to be *desirable* receive serious attention along with those which appear to be *necessary* or required.

Army Ground Forces is anxious to keep tactical doctrine abreast of other advances. In a letter, Headquarters, Army Ground Forces, 22 September 1947, it was directed that all agencies strive towards modernization of techniques of warfare to parallel developments in materiel. Review and revision of doctrine must be continuous. Schools, development agencies, and tactical units are charged with initiating recommendations to amend existing doctrine or to

formulate new techniques. To accomplish this end, any individual may submit proposals through channels suggesting revisions of current methods.

DEVELOPMENT OF PLANNING PROCEDURES

Research and Development procedures have experienced radical changes in the past few years. Prior to World War II efforts were diversified and compartmented into narrow fields of activity. There was only limited and ineffective cooperation between the War and Navy Departments. Within the Army each branch and service was charged with developing requirements and military characteristics for items pertaining to its own agencies without regard to the work being performed by other agencies. Experimental and testing activities were conducted by Infantry, Cavalry, Artillery, and Coast Artillery boards concerned primarily with the requirements of their own branch. Often a similar project was under study by two boards at the same time without coordination of effort. The effect of competition rather than cooperation was the result. Technical committees, provided to effect correlation, did not have the power of decision. Branch jealousies often entered into controversial issues where, due to the autonomy of each arm, prerogatives of the branch chief interfered with the orderly development of standard items suitable for all arms and services.

Although the deficiencies of compartmentation in research and development were obvious and many, the evolution from branch to functional lines was slow and fraught with opposition based on branch jealousies and stubborn adherence to long-established prerogatives. It took World War II, reorganization of the War Department, establishment of the Army Ground Forces, and several years of intense effort by forward thinking individuals to accomplish fully a reorganization in research and development activities with true coordination and guidance from the highest levels.

In Headquarters, Army Ground Forces, the Development Section of the General Staff acts as a collection agency for

all suggestions and ideas for new materiel or modifications to existing materiel. Through its four AGF Boards, it formulates the military characteristics and conducts the required tests for new or modified equipment. In the interest of efficiency, these Boards are organized to conduct tests along functional lines for all Army Ground Forces as opposed to previous branch development where the requirement of the specific arm or service was of primary importance. AGF Boards are concerned with projects pertaining to all the arms and services as a closely related team. The present system has resulted in standardization of equipment throughout the Ground Forces.

Although the branch boards have been eliminated and replaced by the functional Army Ground Force Boards, the service schools are still charged with certain responsibilities previously performed by their branch board. For example, the Commanding General, The Infantry School, is charged, as an agency of the Commanding General, Army Ground Forces, with the development and perfection of infantry and airborne tactics and technique; with the preparation and revision of training publications, Army Extension Courses, instructional manuals, and other publications; and with the conduct of research relative to the improvement of the Infantry. Other service schools are similarly charged with specific requirements. Although many of these duties are performed by regularly established agencies of the schools, it is obvious that there is also a definite need for a screening and coordinating agency to take preliminary action on certain studies and projects in connection with the above missions.

ORGANIZATION OF THE REQUIREMENTS BOARD

A Combat Requirements Section was established at The Infantry Center in January 1946 to assist the Commanding General in certain of the above duties. It prepared studies on the organization, tactics, and technique of the infantry division. It further served as a coordinating group for the Infantry Conference of 1946.

As an outgrowth of the Combat Requirements Section, The Infantry School Requirements Board was established at The Infantry Center by the Commanding General on 21 February 1947. The Board is responsible to the Commanding General, The Infantry Center, and operates directly under his supervision. It was formed "for the purpose of assisting the Commandant of The Infantry School in the execution of his mission as an agency of Army Ground Forces in the development and perfection of Infantry and Airborne tactics and techniques." On 1 July 1947, the scope of the Board was increased by assignment of responsibility for long-range planning for The Infantry Center and The Infantry School.

It must be emphasized that formation of this Board is not an attempt to revive the old compartmented system as exemplified by branch boards. Projects are considered from the viewpoint of the Army Ground Forces as a whole. The testimony considered and incorporated in each study is obtained from representatives of the various arms and services who have potential knowledge of and probable interest in the subject which is being investigated. Agencies other than The Infantry School are consulted for opinions and assistance in arriving at sound and all-embracing conclusions and recommendations. When applicable, complete studies are forwarded by the Commandant to the Army Ground Forces for such action as is deemed appropriate. Such procedure guarantees further that the interests of all Ground Forces will be protected prior to implementation of any project.

FUNCTIONING OF THE BOARD

The Infantry School Requirements Board is composed of only three officers. Its size is limited intentionally to conform to its prescribed method of operation. The Board receives or originates projects, screens them, and prepares an initial study, based on facts obtained from library material, manuals, documents, and other reference sources. The initial paper includes a statement of the project, a presentation

of the facts, broad discussion, and a list of questions covering the controversial points pertinent to the subject. At this stage in the investigation, copies of the study are forwarded to selected individuals or agencies of The Infantry Center or other persons with a request that they consider the material and present their opinions on the listed controversial questions or any other ideas they may have. Persons stationed at Fort Benning, after adequate study of the basic paper, appear before the board by appointment suited to their convenience and testify on the problem. Witnesses are chosen so as to obtain the best-rounded information from officers of the greatest experience on the subject in question and are selected from all arms or services concerned. The background and current status of the instructor group of The Infantry School insures a well-qualified pool of zealous and forward-thinking individuals. The small size of the Requirements Board is thus justified where such a wealth of experience and original thinking is readily available.

Once evidence is assembled, the Board makes a completed study of the project and arrives at detailed conclusions and recommendations. If the study involves a subject which is of interest to or may later become a project of Army Ground Force Board No 3, stationed at Fort Benning, the completed study is forwarded to them for comment. In all cases, studies are submitted to the Academic Department of The Infantry School for concurrence prior to submission to The Commandant for approval. Differences between The Board, The Army Ground Forces Board, and The Infantry School are normally resolved by a revision of the study so as to reconcile the opinions of all three. All studies are carefully reviewed by the Commandant in person and if approved, are forwarded, where applicable, to higher headquarters with definite recommendations for implementing action or other indicated disposition. Where the findings affect the interests or responsibilities of agencies other than the Infantry School, recommendations are introduced in the study that the paper be referred to such specific installations for comment or other indicated action. Obviously,

certain projects of a purely local nature are retained at The Infantry Center. These are utilized as a basis or background for further action or planning. Studies of this type relieve regular staff sections and other activities of unusual burdens and free them for more intense activity in current operations.

Thus, the Infantry School Requirements Board fills a definite need in the operation of The Infantry Center. Its purpose is to supplement rather than displace other agencies. The mission is one of screening, studying, and compiling data on various projects which are received. It attempts to coordinate the collective thoughts of various individuals and agencies and crystalize the ideas of the several individuals into a sound solution of the problem undertaken. Findings are curbed and tempered by the checks and balances described above. The end product tends toward balanced thinking, in that other agencies exercise critical analysis and suggested revision through the procedure of concurrence or nonconcurrence in the basic study. The method of functioning tends to avoid branch jealousies and compartmentation. Final recommendations are concerned with the needs of the Armed Forces as a whole and are designed to further our national position as a military power.

The Board has been assigned 53 projects since its inception; 2 studies have been cancelled, 3 have been suspended, 5 are currently under study, and 43 have been completed. The projects investigated fall into the following general catagories:

7-Personnel and Training.
8-Organization and Staff.
14-Tactics and Doctrine.
22-Equipment and Supply.
2-Miscellaneous.

The scope of these projects has been extremely diverse. They have varied from recommendations for minor modification in small arms to broad problems involved in the application of atomic weapons. Studies have embraced investigation of organizations from the squad to the field army. T-shirts and tanks have been subjects for simultaneous

study. Rest and recuperation, grenades, and doctrine for armored infantry and infantry-tank training were being pursued concurrently with an attempt to determine if there is a need for an infantry fire direction center. The requirements for developing or modifying training equipment, films, and literature pertaining to a variety of subjects have been assigned to the Board. It is obvious from the diverse character of these and the many other varied subjects studies, that evidence must come from many sources and individuals in order to justify findings of proper worth. Thus a small board, exploiting many sources for information, is able to investigate and report on a large variety of subjects.

NECESSITY FOR COOPERATION

The mere existence of agencies such as the Infantry School Requirements Board however, is not enough; the conscientious cooperation of personnel on all command levels is required to furnish the basic ideas which, in turn, will implement research and development. All individuals must be constantly alert for means and methods of improvement. *Anyone who observes the employment of an antiquated method or piece of equipment is in a position to do something about it.*

The diversity of the organizations set up to consider, evaluate, and review proposals make it comparatively easy for any individual to gain a professional audience for his idea. Each service school, Army Ground Forces, the Technical Services, and other corresponding organizations are prepared to consider a proposal. The scope of the idea itself determines the level on which final action will be taken. However, present procedures provide for approval at a high enough level to insure that the best interests of all arms and services are given due consideration. A proposal submitted

to a basic level board such as The Infantry School Requirements Board will be examined and evaluated. When appropriate, a full study will be accomplished and a report recommending action will be forwarded. In all cases the originator will receive due credit for submission of the idea and will be informed of the action taken.

Radical and unusual ideas are particularly desirable, but minor modifications or revisions to technique, methods, doctrine, or materiel will receive equal attention. Progressive and original thinking, inventiveness, and resourcefulness are needed to keep the U.S. Army abreast of the potential speed of possible future military operations.

Adjustment of Observed Fires

Combat reports from World War II indicated that a change for the better was needed in the method of adjustment of indirect fire for several reasons: Varied terminology and language among air, navy, and ground force units often led to confusion, delay, and misunderstanding. The two principle methods of observed fire procedure used in the last war varied considerably and resulted in further difficulty. For example, the forward observer used to send his *sensings in yards* (the burst is 200 right, 400 over) to the fire direction center while in the battery commander method the observer would send *commands in mils* to the firing pieces. Another and perhaps more potent reason why the observed fire procedure was changed, was the lack of target effect which so often occured because the forward observer was attempting to adjust with reference to the *gun-target line* and not obtaining brackets. The farther he was removed from the gun-target line, the more difficult his problem.

All infantrymen are well aware of the fact that their job is made easier a thousand-fold by intelligent use of their own and other supporting arms. Therefore it is only logical that a single, easily understood language and a single, simple system of adjusting supporting fires be developed for all arms. Both of these objectives have been accomplished. The language has been established in WDTC 6, 13 June 1946 and in WDTC 11, November 1946. The simplified observed fire procedure has been published in Change 2, FM 6-40, Field Artillery Gunnery.

It is the purpose of this article to consolidate the information contained in the two War Department Training Circulars with a digest of the bracketing procedure as recently published so that any infantryman with a basic knowledge of observed fire adjustment can understand the simplified procedure common to all arms.

BRACKETING

The bracketing procedure as developed and published is necessary because of the inaccuracies of range estimation, and because no individual has the ability to tell exactly *how far over* or *how far short* a burst is in relation to the target. Bracketing is the only sure way that an observer can *know* that he is going to get on the target. After a target has been pinned between two known bursts it is a simple matter to keep splitting the distance between bursts until effective fire is being placed on the target area.

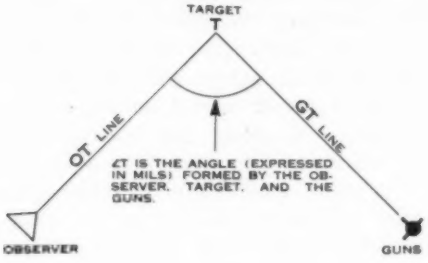


FIGURE 1.

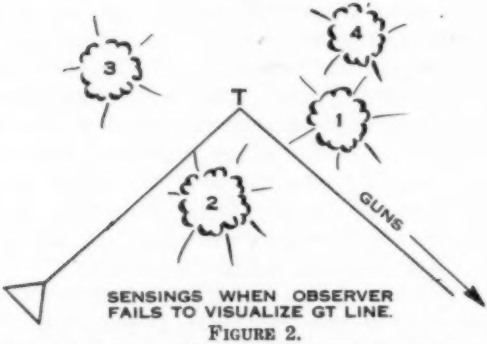


FIGURE 2.

Burst 1—Sensed to the right—correction sent to the gun to move to the left.
Burst 2—Sensed to be short—correction sent to the gun to add.
Burst 3—Sensed to the left—correction sent to the gun to move to the right.
Burst 4—Sensed to be over—correction sent to the gun to drop.
Burst 5—Will be back where the first round landed and still no target effect.

In the method of adjustment used throughout the war, sensings were made in relation to the *GT* line. Thus, when the observer was on or close to the line and could sense deflection changes directly, a simple bracket in range was sufficient. This is also true of the recently adopted system. However, when the observer moved to the right or left of the *GT* line any appreciable distance the situation was altered. He could not sense accurately on the *GT* line because he could not sense deflection positively. As a result, observers frequently called for fire for effect when they were nowhere near the target. The diagram in figure 2 shows how this might easily happen.

One can readily see that in many cases where the observer was off the *GT* line, ammunition was expended with little or no effect on the target. A system had to be developed whereby the observer could be certain that he was obtaining a bracket both in range and in deflection, and common sense indicated that the only line on which he could accurately sense was the line which he could observe accurately—the observer-target *(OT)* line. It was reasoned that if the observer could move the bursts to the *OT* line and keep them there, he could pinpoint the target since he would know definitely that he had a bracket regardless of where the guns were located. Therein lies the advantage of the recently adopted system. Bracketing on the *OT* line, using only postive information, results in delivery of more effective fire in the target area and allows an observer to proceed with confidence and accuracy.

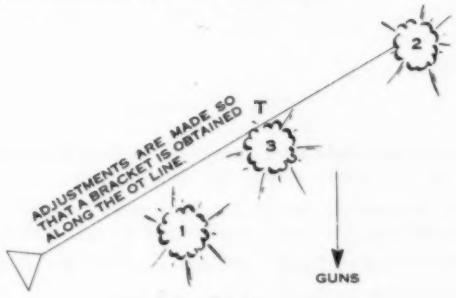


FIGURE 3.

GENERAL PRINCIPLES OF CONDUCT OF FIRE

The principle underlying observer conduct of adjustment is that *all bursts should remain on or near the observer-target line.* To accomplish this purpose, either range bracketing or deflection bracketing may be used. Both procedures will be discussed later in detail.

To properly adjust fire, an observer *must sense the bursts.* This means that he looks at the burst and determines immediately whether the burst is right, left, short, or over the target as he views it. The observer must sense what he

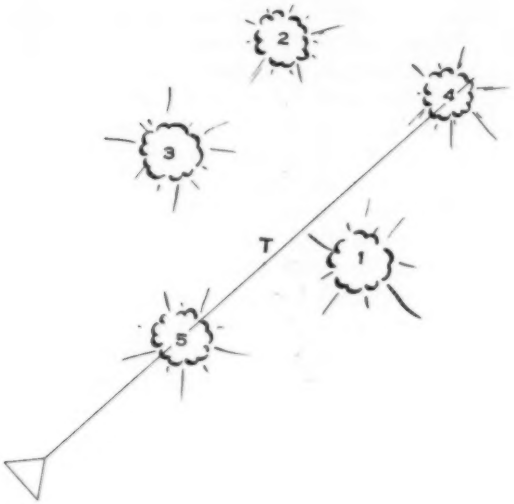


FIGURE 4.—Sensings.

Burst 1—is sensed right and, under favorable conditions (wind blowing the smoke across the *OT* line), could be sensed over.

Burst 2—is sensed left but is too far away from *OT* line to sense positively for range and would be called doubtful.

Burst 3—is sensed positively left but doubtful for range.

Burst 4—is sensed positively on line and over.

Burst 5—is sensed positively on line and short.

sees, not what he thinks he sees. When a burst is considerably wide of the target, an observer should sense with caution. *He should proceed only from a positive sensing,* taking advantage of drifting smoke and terrain to enable him to accurately judge the location of the round. A positive sensing means one in which there is *no doubt* in the observers mind as to where the round burst in relation to the target. (See figure 4.)

The object of sensing is to permit adjustment of subsequent rounds to obtain a bracket; that is, to definitely establish the target between two known bursts (see figure 5). It may be bracketed by either a range change or by a deflection change. Once either the range or deflection bracket has been established, it is simple for the observer to cut the bracket to the appropriate size and fire for effect.

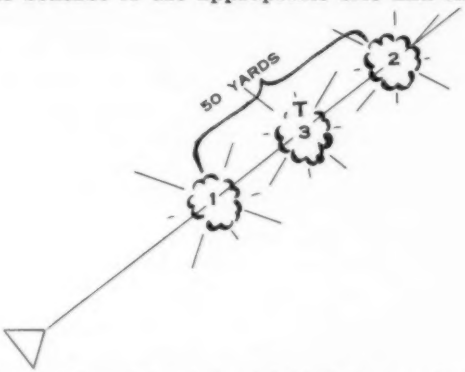


FIGURE 5.—The 50-yard bracket established by rounds 1 and 2 is split to obtain a target hit wtih round 3.

As the terms *range bracketing* and *deflection bracketing* were mentioned previously, the question arises as to what determines which method will be employed? The controlling element in bracketing is that element (either range or deflection) which is more difficult to sense. It has been established that when angle *T* is less than 500 mils the observer will bracket in range; when angle *T* is greater than 500 mils he will bracket in deflection. (A full explanation of how the observer determines the value of angle *T* follows later.)

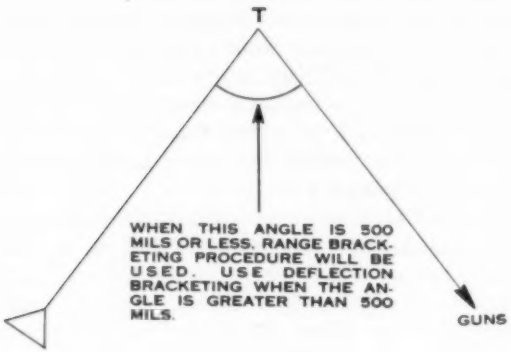

T
WHEN THIS ANGLE IS 500 MILS OR LESS, RANGE BRACKETING PROCEDURE WILL BE USED. USE DEFLECTION BRACKETING WHEN THE ANGLE IS GREATER THAN 500 MILS.
GUNS

FIGURE 6.—The mil value of angle *T* determines whether range bracketing or deflection bracketing procedure will be used.

Since it is necessary to keep the bursts on the observer-target *(OT)* line, it becomes evident that some method is required which will not impede bracketing procedure. When the *OT* line coincides with the *GT* line, it is quite simple; all the observer must do is bracket in range and make his deflection corrections directly to the line.

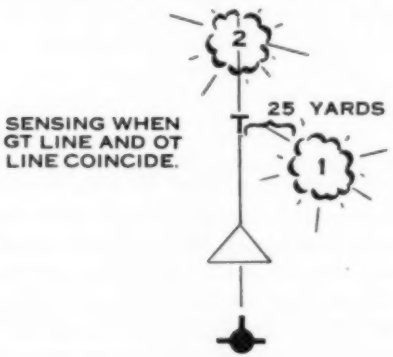


FIGURE 7.

Burst 1—is sensed right and short.

Burst 2—is sensed line, over (observer computed or estimated 25 yards deflection change to get on *OT* line and combined it with a range change to bracket the target).

However, more often than not, the observer will find himself off the *GT* line. This produces an additional problem; namely, that of combining deflection and range changes to keep the burst on the *OT* line.

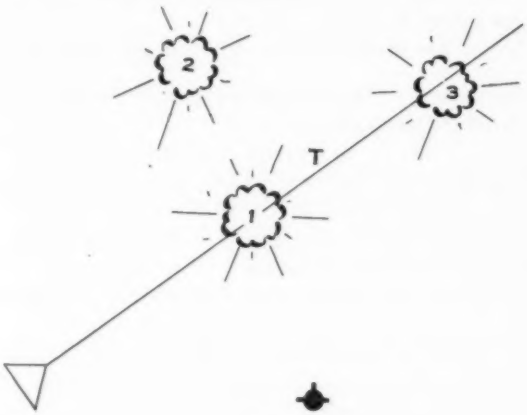


FIGURE 8.

Burst 1—is sensed as a line short. To obtain a bracket, the observer will increase range.

Burst 2—is the result of an increased range with no corresponding deflection shift to bring the burst back to the *OT* line. It is sensed left and over.

Burst 3—has been brought back to the *OT* line by a deflection shift.

Actually the observer can combine the corrections so that burst 2 is eliminated and all subsequent bursts will remain on or near the *OT* line.

It can be seen readily that except when angle *T* is zero, for every range change, a deflection change must be made (and *vice versa*) to keep the bursts on or near the *OT* line. Before discussing this procedure which actually constitutes the crux of the problem, it is necessary to review the terms and definitions applying to all observed fires as published in WDTC 6, June 1946, and the proper procedure for obtaining observed fires as published in WDTC 11, November 1946.

TERMS AND DEFINITIONS

The following terms and definitions apply to observed fires from all weapons. This standardization of terms permits any individual capable of conducting an observed fire problem with an infantry weapon to adjust the fire of artillery or naval gunfire:

add (drop) (so many yards), to increase (decrease) the range.

close, to indicate that the target is within 600 yards of friendly forward elements.

close (open) sheaf, to narrow (widen) the sheaf.

converge sheaf (so many yards), to obtain a converged sheaf (or a sheaf of any desired width).

deep, to indicate that the target is more than 600 yards from friendly forward elements.

error (followed by proper data), to change an erroneous correction.

fire for effect, in area fire, to indicate that the adjustment is satisfactory and the unit is to fire for effect. In precision fire, this term is not used as a command but is used to refer to the rounds fired after the trial range has been determined.

fire mission, warning order to alert the fire direction center and to indicate that the message to follow is a request for fire.

left (right) number of yards to correct deflection.

line shot, a burst occurring on the *OT* line.

lost, (followed by correction to obtain observation), indicates last volley or round was not observed.

measured deviation, the number of mils between ranging rounds as the observer measures them with his field glasses.

mission accomplished, desired effect on target has been obtained (guns will cease fire).

observed deviation, lateral distance in yards between ranging rounds computed by the observer using the mil relation formula.

ranging rounds, two rounds fired as rapidly as possible from the adjusting piece, the first round where ordered by the observer and the second round at a range 400 yards (unless otherwise ordered) greater.

repeat deflection (range), to obtain fire at same deflection (range) as the previous round.

S factor, the deflection change in yards necessary to keep the burst on the observer-target line for every one hundred yard change in range.

salvo right (left), to obtain a battery salvo beginning with the right (left) piece.

special corrections, individual corrections for lateral distribution and variation in range between pieces when required.

suspend fire, to interrupt fire prior to ending a mission—adjustment will continue after a short delay.

up (down) (so many yards), to correct for difference in altitude in target area or to raise or lower the height of burst in time area fire.

PROCEDURE TO OBTAIN FIRE

An observer must be able to talk in a language understandable to any supporting firing unit, Army or Navy, to enable that unit to place the fire where it is desired.

The initial fire message sent by a forward observer to a fire direction center is composed of the following elements:

Identification of observer
Warning order
Location of the target
Nature of target
Classification of fire
Type of adjustment
Type of ammunition
Control

A detailed explanation of each element follows:

Identification of observer. The observer, when necessary, identifies himself by means of a code word or number. Example: OP NO 1, RED DIAMOND, etc.

Warning order. To alert the fire direction center, the observer sends FIRE MISSION.

Location of target. The location of the target may be given in one of the following ways:

1. By giving a shift in yards from a point the location of which is known to the fire direction center. The shift is given in the sequence; known point, deflection, altitude (when applicable), and range. For example, the observer should send back:

FROM BASE POINT
LEFT 300
ADD 400

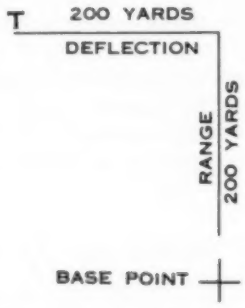


FIGURE 9.—Observer purposely increases both elements in order to get a round on the *OT* line beyond the target. His next round, if properly sensed, will bracket the target along the *OT* line.

2. By giving coordinates to a map, photo map, or vertical or oblique photo.

3. By means of a geographic direction and distance from a known point, such as:

FROM CR 224
NORTH 400
EAST 500

4. By requesting a working round from which fire can be shifted to the target.

MARK BASE POINT
MARK CHECK POINT NO 3
MARK CENTER OF SECTOR

Nature of target. A brief description of the target provides information as to the importance of the target and indicates the best type of fire. Example: MACHINE GUN, TROOPS IN OPEN, ANTITANK GUN, etc.

Type of adjustment. Adjustment by a single gun will normally be used. (Field artillery uses two guns on area

target adjustment.) If a special type of fire (close sheaf; open sheaf) is desired, it is requested. If salvo is desired, the observer sends SALVO RIGHT (LEFT).

Type of ammunition. The observer designates the type of projectile and fuze depending on the type of target and effect sought. If no specific type of ammunition is specified, HE with fuze superquick will be fired.

Control. The observers' designation of control will consist of one of the following:

1. *Will adjust.* This indicates that the observer is so located that he can adjust the fire and that such adjustment is necessary. If observation is difficult or intermittent, the observer precedes WILL ADJUST by AT MY COMMAND. When this occurs the FDC will announce READY and the observer will command FIRE when he is able to observe. This procedure remains in effect until a subsequent correction is followed by the command WHEN READY.

2. *Fire for effect.* When this is transmitted as part of an initial fire message the observer considers that his location of the target is correct, no adjustment is necessary, and surprise fire is desirable. He observes this fire for effect and, if necessary, sends corrections to increase the effect of subsequent fire for effect on the target.

3. *Can not observe.* This indicates that the observer will be unable to adjust the fire.

Examples of initial fire messages:

FIRE MISSION
MARK BASE POINT
TROOPS IN FOXHOLES
WILL ADJUST

OP NO 1
FIRE MISSION
JIG MIKE 9763
INFANTRY IN FOXHOLES
HE, FUZE DELAY
AT MY COMMAND
WILL ADJUST

FIRE MISSION
FROM BASE POINT
RIGHT 400
UP 50
ADD 600
MACHINE GUNS
WILL ADJUST

OP NO 2
(42.7 - 93.6)
TROOPS ASSEMBLING
FIRE FOR EFFECT

Information sent to observer. If the mission can not be fired, the observer will be notified WILL NOT FIRE. If a target is to be fired upon, the fire direction center furnishes the following information to the observer:

Example: 1. Adjusting piece NO 3
2. Projectile fuze HE, DELAY
3. Concentration No assigned CONCENTRATION NO 30
4. Time of firing WHEN READY

The observer is informed ON THE WAY as each round is fired during adjustment and when fire for effect commences. He is notified ROUNDS COMPLETE when fire for effect has been completed.

Subsequent corrections. Any element of subsequent correction other than deflection and range may be omitted if no change in that element is desired. If the same deflection and/or range is desired, the observer sends back REPEAT DEFLECTION (RANGE). Subsequent corrections are given in the following sequence.

Deflection correction
Distribution correction
Height of burst correction
Time correction (in time registration)
Change in special requirements (change from single gun to salvo or volley)
Change in number of rounds to be fired
Change in ammunition (to fuze delay from fuze superquick)
Range correction

Correction of errors. If the observer transmits a fire message and finds he has made an error in one of the elements, he sends ERROR followed by correct information pertaining to that element in error. If an element is omitted, the observer sends that element to the fire direction center as a separate transmission.

DETERMINING THE DEFLECTION FACTOR (*S*)

Once the basic terms, definitions, and procedures has been mastered, the observer must learn to compute the value of the deflection factor *S*. This is simply defined as the necessary deflection change required to keep the burst on the *OT* line for each 100-yard range change. It may be determined by any of the following methods:

a. Estimation and subsequent correction by firing.

b. Computation using the formula $S = 1/10\ T$ (If angle T is less than 600 mils). Angle T is the angle formed by the observer, target, and guns (see figure 1).

c. Using ranging rounds.

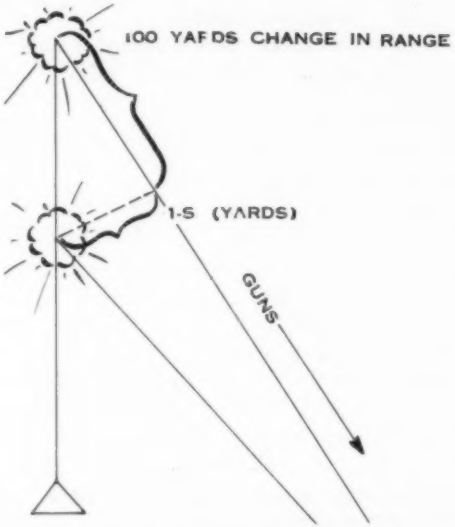


FIGURE 10.—The factor *S*.

Determining *S* by estimation is self-explanatory. However, determination by use of ranging rounds requires further clarification. Ranging rounds consist of two rounds fired on the observer's command, as rapidly as possible from the adjusting piece, with the first round fired where ordered by the observer and the second round at a range 400 yards greater. (Note: The observer can vary the distance

between ranging rounds in his fire message. Also, it is SOP for the gun to relay immediately with data used on the first ranging round.)

When the ranging rounds are fired, the observer proceeds as follows:

a. He notes the line established by the two ranging rounds and visualizes the gun-target line.

b. He measures the mil distance (henceforth known as *measured deviation)* between the bursts and converts this deviation to yards by means of the mil relation formula.

$$\frac{W}{RM} = 1$$

W = width in yards
R = range in *thousands* of yards
M = angular distance in mils

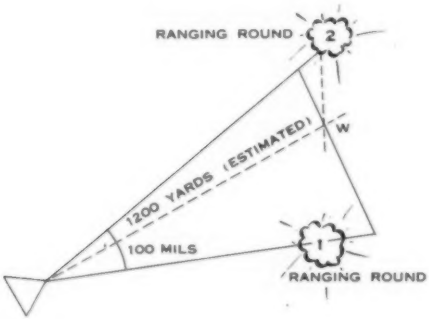


FIGURE 11.

1st Step: Measure mils between bursts = 100 mils.
2d Step: Estimate range to midpoint between ranging rounds = 1200 yards.
3d Step: Using the mil relation formula, find the lateral distance (W) in yards between the bursts in the diagram above. This is done as follows:

$\frac{W}{RM} = 1$: Substituting, $\frac{W}{1.2 \times 100} = 1$ or W = 120 yards.

When the measured deviation (100 mils in this case) is converted to yards (120 yards in this case) it is then termed *observed deviation.* Thus, observed deviation is the lateral distance in yards between the bursts.

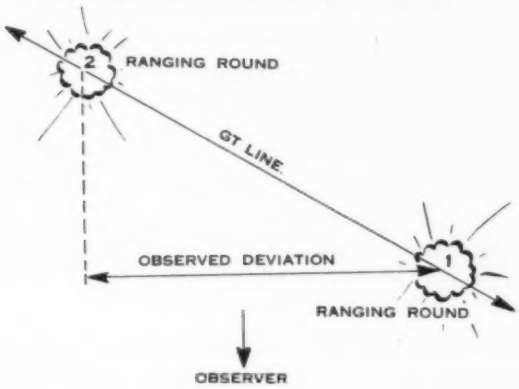


FIGURE 12.—Observed deviation is the distance in yards between ranging rounds *as seen by the observer.*

If the observed deviation is less than 200 yards, the observer divides it by the number of *hundreds of yards* between ranging rounds to secure an *S* in yards. In the previous example the observed deviation was computed to be 120 yards. Since the ranging rounds were fired 400 yards apart, divide 120 by 4 to give an *S* of 30 yards. This means that for every 100-yard range change, a deflection shift of 30 yards must be incorporated to keep the burst on the *OT* line. Similarly, had the ranging rounds been fired only 200 yards apart (at the observers request), the observed deviation of 120 yards would be divided by 2 resulting in an *S* of 60 yards.

When the observed deviation is more than 200 yards (ranging rounds 400 yards apart), the value of *S* is no longer equal to approximately one-fourth the value of the observed deviation. Instead, the observer uses the following table of approximate values to obtain a usable *S*.

Observed deviation (Yards)	Use *S* of (Yards)
250	80
300	100
350	200

For greater values of observed deviations a precise determination of *S* is not required.

If the observed deviation between ranging rounds (400 yards apart) is 200 yards or less, range is the controlling element and range-bracketing procedure will be used. If the observed deviation is greater than 200 yards (ranging rounds 400 yards apart), deflection is the controlling element and deflection-bracketing procedure will be used.

CONDUCT OF FIRE BY RANGE-BRACKETING PROCEDURE

Range-bracketing procedure is employed habitually when the observed deviation between ranging rounds (400 yards) is less than 200 yards (less than one-half the known distance between ranging rounds) or when the value of angle *T* is less than 500 mils. The object of adjustment when using this procedure is to enclose the target within a range bracket along the observer-target line and to continue splitting the bracket, keeping the bursts along the *OT* line, until fire is effective.

The observer first determines whether he will require the use of ranging rounds to determine the type of bracketing to be used and the value of *S*. If such is the case, he proceeds as previously described. However, if he wishes to estimate the value of *S* or compute it ($S = 1/10\ T$) he calls for the first round. In either case, his next action is to bring a round onto or near the *OT* line.

After a line shot has been obtained, the observer calls for a range change sufficient to obtain a bracket and incorporates a deflection change of one *S* for each 100-yards of range change in order to keep the burst on the *OT* line. When a burst off the *OT* line is sensed positively for range, the observer's deflection correction combines: (1) the shift to bring the off-line burst to the line and, (2) the shift to stay on the line when the range is changed. The observer continues adjustment until a 50-yard bracket has been split (for infantry weapons) along the *OT* line or until effective fire is being delivered on the target.

Observer to FDC (initial fire message):

OP 1, FIRE MISSION, MARK BASE POINT, FIRE RANGING ROUNDS, WILL ADJUST.

FDC to Observer:

RANGING ROUNDS, FUZE QUICK, BASE POINT, WHEN READY . . . . ON THE WAY.

Remarks: *OT* distance from map = 2,000 yards. With field glasses, observer measures 40 mils between ranging rounds. Observed deviation = 80 yards (40 × 2). *S* = 20 yards (80/4). Guns to right rear. Range-bracketing to be used. No range sensing obtained. First ranging round is 80 mils right of *OT* line. Observer determines shift of 160 yards (80 × 2) necessary to bring burst to *OT* line.

Observer to FDC:

LEFT 160. REPEAT RANGE.

FDC to Observer:

ON THE WAY.

Observer to FDC:

RIGHT 40, ADD 200.

FDC to Observer:

ON THE WAY.

FIGURE 13.—Range-bracketing procedure.

Observer to FDC:

LEFT 20,
DROP 100.

FDC to Observer:

ON THE WAY.

Observer to FDC:

LEFT 10,
ADD 50.

FDC to Observer:

ON THE WAY.

Observer to FDC:

RIGHT 5,
DROP 25,
FIRE FOR EFFECT.

FDC to Observer:

ON THE WAY.

Observer FDC:

MISSION ACCOMPLISHED

FIGURE 13.—Range-bracketing procedure. (cont'd)

Fire for effect is started when a suitable adjustment has been obtained; that is, when deflection and range are correct or when effective fire will result with the next split in bracket. If additional fire is needed, the observer should use the information obtained from the first fire for effect, make corrections, and repeat fire for effect.

DEFLECTION-BRACKETING PROCEDURE

When the angle observer-target-gun is greater than 500 mils, deflection is the controlling element and deflection-bracketing procedure will be used. This is also true when the use of ranging rounds discloses that the *observed deviation* between rounds is greater than 200 yards or greater than half the distance between ranging rounds.

In deflection bracketing, bursts are brought to the *OT* line by range changes. To facilitate bringing off-line bursts to the *OT* line, a range factor *d* is employed by the observer. To determine *d*, the observer measures the distance in mils between ranging rounds and divides this angle by 4 (if ranging rounds are 400 yards apart). The mil deviation of off-line bursts is divided by *d* to determine the number of 100-yard range bounds necessary to bring bursts to the *OT* line. When the observer is so close to the target that the use of angle measuring instruments is impracticable, he is able to estimate the amount of range change necessary.

When a burst cannot be sensed positively for deflection because of its deviation from the *OT* line, the amount of deviation is measured in mils and a range correction to place the next burst on the line is determined by dividing the deviation by *d* and multiplying by 100. For example: The observer senses deflection doubtful (80 mils right of the *OT* line); the value of *d* is 20; the piece is on the right. The range to place the next burst on the line is $80/20 \times 100 =$ 400 yards. The observer sends: REPEAT DEFLECTION, ADD 400. It may be necessary to bracket the line with range changes to secure line shots. Because of dispersion and irregular ground, it often may be difficult to obtain successive line shots. *Minor deviations should be ignored unless such procedure makes it impossible to obtain sensings.*

When a line shot is obtained, a range change of 100 yards is made for each *S* deflection change in order to keep the

Observer to FDC:

OP NO 1, FIRE MISSION, MARK BASE POINT, FIRE RANGING ROUNDS, MACHINE GUN, WILL ADJUST.

FDC to Observer:

ABLE, RANGING ROUNDS, FUZE QUICK, CHECK POINT 1, WHEN READY... ON THE WAY.

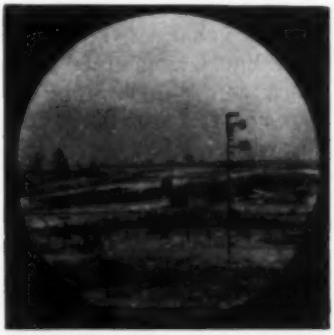
Remarks: Deflection sensing obtained from second ranging round. *OT* distance from map = 2000 yards. With field glasses, observer measures 125 mils between ranging rounds. Observed deviation = 250 yards (125 × 2). *S* = 80 yards. Range factor = 30 mils (125/4). Deflection-bracketing to be used. Observer decides to make 4-*S* shift. Since first burst is 400 yards off line (in range) no range change will be required to place next burst on *OT* line when 4-*S* deflection shift is made.

Observer to FDC:

LEFT 320, REPEAT RANGE.

FDC to Observer:

ON THE WAY.



Observer to FDC:

RIGHT 160, ADD 200.

FDC to Observer:

ON THE WAY.

Remarks: To bring next burst to the *OT* line, change in range of 50 yards (15/30 × 100) (*d* factor) is indicated.

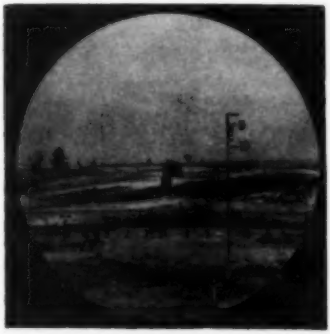
FIGURE 14.—Deflection-bracketing procedure.

Observer to FDC:

REPEAT DEFLECTION,
DROP 50.

FDC to Observer:

ON THE WAY.



Remarks: Range bracket between sensed rounds is now 150 yards (200 — 50).

Observer to FDC:

LEFT 80,
DROP 75.

FDC to Observer:

ON THE WAY.

Remark: Range bracket is now 75 yards; deflection bracket is 80 yards.

Observer to FDC:

RIGHT 40,
ADD 40.

FDC to Observer:

ON THE WAY.

FIGURE 14.—Deflection-bracketing procedure. (cont'd)

Observer to FDC:

LEFT 20,
DROP 20,
FIRE FOR EFFECT.

FDC to Observer:

ON THE WAY.

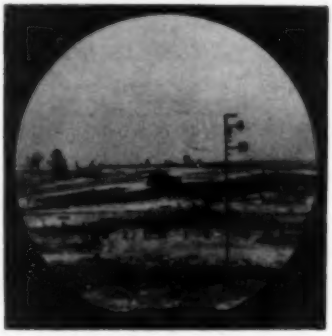


FIGURE 14.—Deflection-bracketing procedure. (cont'd)

burst on the *OT* line. When a burst off the *OT* line is sensed positively for deflection, the observer's range correction *combines* the range change to bring the off-line burst to the *OT* line (range factor *d*), and the range change to stay on the *OT* line when the deflection is changed (deflection factor *S*.)

When a deflection bracket is obtained, it is split. Thereafter, bursts are kept on or near the *OT* line by splitting the range bracket between sensed rounds. If positive sensings can not be obtained from bursts not on the *OT* line, the observer must modify the range bracket to bring off-line bursts to the line, and then split the resulting bracket. An example of the procedure employed in keeping bursts on the *OT* line is as follows:

During adjustment a line shot has been obtained which the observer senses as line short; he decides to shift the deflection 2 *S's*, *S* is 80; the piece is on the right. He sends, RIGHT 160, ADD 200. The next burst is to the left of the *OT* line, but he obtains a sensing of over. With the use of the range factor, he determines that a correction of DROP 40 would place the last burst on the *OT* line. Therefore, he would consider the range bracket to be 160 yards instead

of 200 yards, and his next correction should be LEFT 80, DROP 120 (Drop 40 to stay on the line, drop 80 to split the effective range bracket of 160 yards). This correction should place the next burst on or near the OT line. The brackets are decreased until the bursts are brought within effective radius of the target, or until the target is hit.

FLANK OBSERVATION

As the *OT* line approaches the perpendicular to the *GT* line, the observer must modify the described procedure for staying on the *OT* line. The true value of *S* increases very rapidly as the observer's position approaches the flank of the target; for example, when the observer approaches to within 300 mils of the perpendicular to the *GT* line, the value of *S* has increased to approximately 340 yards. Based upon firing, the observer may find it necessary to make very small changes (or no change at all) in range to keep bursts on the *OT* line when a deflection shift is made.

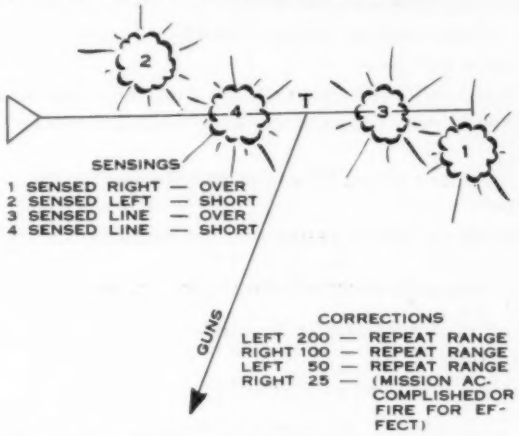


FIGURE 15.—Adjusting procedure when observing from the flank.

The procedures outlined in this article are designed to minimize the time required to get fire for effect on the target and provide positive information upon which to base adjustment and determine the effectiveness of fire. In the infantry, however, only a limited number of personnel will have an opportunity to fire a sufficient number of

problems to obtain the optimum degree of proficiency. It must be noted that any individual, regardless of lack of previous experience, applying the basic procedures intelligently will be able to adjust the fire of any army or navy weapon onto a target. Any observer can, *without computation:*

a. Bracket the target on the *OT* line.

b. Make changes only when the previous round was *positively* sensed.

c. Fire for effect only when a suitable bracket (normally 50 yards) has been split or when the target is hit.

These three steps comprise the essential principles which result in accurate fire for effect on the target area. Following is a step-by-step summary of the procedure in adjusting observed fires when the observer is off the *GT* line:

1. Locate target.
2. Request ranging rounds.
3. *a.* When ranging rounds burst:

(1) Note *GT* line.

(2) Read mils between *OT* line and the first burst.

(3) Read mils between ranging rounds (measured deviation).

(4) Estimate range to midpoint between bursts.

b. Then:

(1) With estimated range and measured deviation, using $\frac{W}{RM} = 1$, compute observed deviation (in yards) and determine type of bracketing to be used.

(2) Obtain *S*.

(a) For range bracketing:

$$S = \frac{\text{observed deviation}}{\text{distance between ranging rounds in hundreds of yards}}$$

(400 yards is 4; 200 yards is 2; etc.)

(b) For deflection bracketing:

Use S of:	*For observed deviation of:*
80 yards	250
100 yards	300
200 yards	350

(3) If observed deviation is more than one-half the known distance between ranging rounds, use deflection bracketing and compute d:

$$d = \frac{\text{measured deviation}}{\text{distance between ranging rounds in hundred of yards}};$$

(If rounds are 400 yards apart, use 4; if 200 yards apart, use 2; etc.)

4. Bring bursts to the *OT* line:

a. In range bracketing, by a deflection shift.

b. In deflection bracketing, by a range change, in yards, determined by using d or estimating.

5. Keep bursts on *OT* line.

a. For range bracketing, by shifting deflection one *S* for each 100-yard range change.

b. For deflection bracketing, by making a 100-yard range change for each one-*S* deflection shift.

Note: When range is pushed away (increased) from the observer, deflection is also pushed away, and *vice versa*.

c. Correct elements as adjustment indicates.

d. Ignore small variations from *OT* line if sensing is positive.

6. Fire for effect when:

a. Target hit is obtained.

b. 50-yard range bracket is split or a 10-yard deflection bracket is split (for infantry weapons).

Movement of an Infantry Regiment by Motor

Can you plan a movement of an infantry regiment by motor? Will your plans be within the capabilities of the troops and organic transport of your regiment? Will the serial (battalion) and march unit (company) commanders be able to adhere to the schedules and routes prescribed in your order?

Looking back over your experiences you can undoubtedly recall many that were not wholly successful.

By "successful" we mean specifically:

1. That *all* of your men reached the destination in physical and mental condition to accomplish their mission.

2. That your plans facilitate maintenance of control and command unity throughout the march.

3. That prepared schedules (march tables) are based on actual reconnaissance or study of the route(s) and are within capabilities of troops and vehicles.

The problem in troop movement which follows is designed to give you a review and practice in the development of step-by-step preparation for a movement of an infantry regiment by motor.

For the reader, whether you be an experienced master in this art or an energetic noncommissioned officer aspiring to a commission, this exercise is offered as a challenge. The solutions to each requirement may be found beginning on page 68. It is suggested that the beginner check the answers as he goes; that the experienced hand work the entire problem through before checking his results.

A score sheet is provided along with the solutions for use in grading. When you have finished, check your score on page 75.

GLOSSARY
TERMS AND DEFINITIONS

column, all the elements of a unit using a single route for a single movement of troops.

critical point, points along the route of march where smooth execution of movement may be interrupted.

march unit, an element of a serial or column which moves and halts on the order or signal of its commander. March units are prescribed primarily to facilitate control. *Abbrev*: MU

minimum time interval, the minimum time in minutes placed between march units and serials which will assure travel at the same rate over the same part of the road. The result of the proper minimum time interval is that the lead vehicle of each unit can proceed at the normal rate until it is actually slowed by the obstacle (detour, congested area, blown out bridge, etc.) instead of being forced to slow down by closing on the tail of the preceeding unit before it reaches the obstacle. (See formula below.) *Abbrev:* Min TI

open column, in this type of column, an effort is made to maintain approximately constant intervals between vehicles at all speeds. Thus the density and the distance between trucks is independent of the speed, and must be specified for each movement. The density for open column formation will vary from 10 to 24 trucks per mile hence the vehicles will be somewhat more widely dispersed in this formation than in a closed column. Consequently they will be more secure against enemy attack; with, however, a corresponding loss of control due to greater dispersion.

rate of march, the average speed of a column over a period of time including short, periodic halts. *Abbrev*: R

road space, the length of an element on the road, from head to tail, measured in miles or yards. *Abbrev*: RS

serial, one or more march units under one commander. Serials are prescribed to simplify the planning and issuing of orders and to effect control during the movement. A serial usually includes all those elements of the column to which a single set of instructions will apply.

speed, the rate of movement at any given instant.

time distance, the time it takes the head of the column to move from one point to another. It is computed by dividing the distance to be traveled by the rate of movement. *Abbrev*: TD

time interval, the time which elapses between successive march units, serials, or columns as they move past a given point. It is measured from the instant the tail of one unit clears a point to the instant the head of the next unit reaches the same point. *Abbrev*: TI

time length, time required for a column or element thereof to pass a given point. *Abbrev*: TL

FORMULAS

minimum time interval = time length of the longest march unit at reduced rate *minus* time length of the longest march unit at normal rate.

$$\text{road space (miles)} = \frac{\text{No trucks}}{\text{density}} + \text{time intervals (hrs)} \times \text{rate (mph)}$$

$$\text{time distance (hours)} = \frac{\text{distance traveled (miles)}}{\text{rate (mph)}}$$

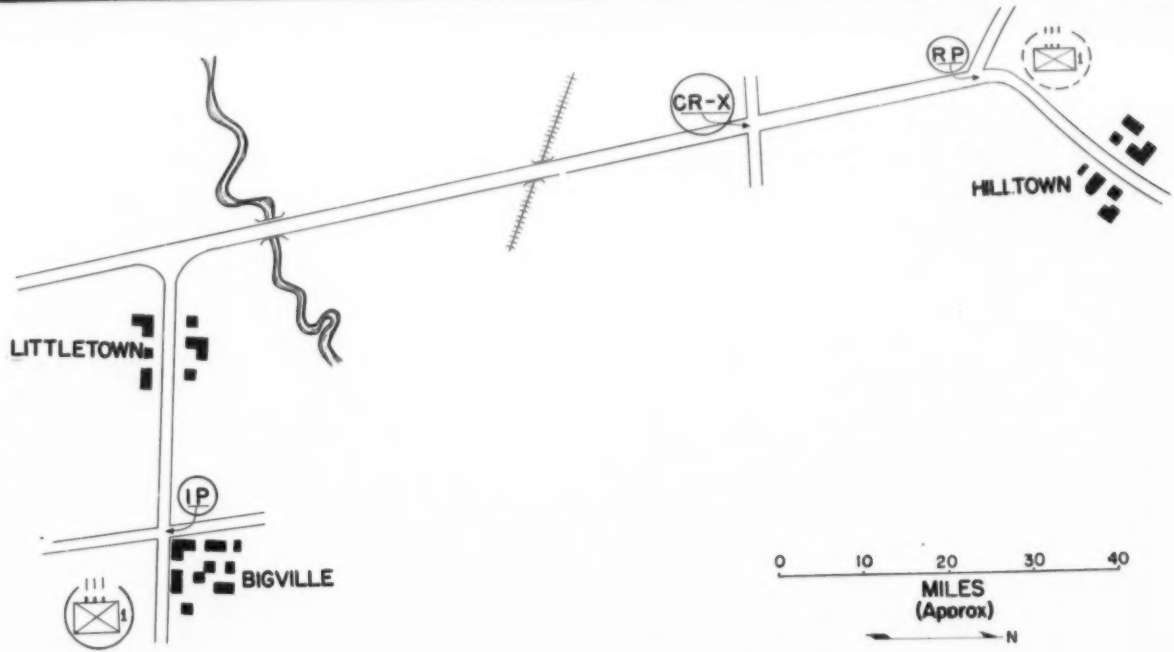
$$\text{time length (hours)} = \frac{\text{road space (miles)}}{\text{rate (mph)}}$$

$$\text{time length (minutes)} = \frac{\text{No trucks} \times 60 \text{ (minutes)}}{\text{density} \times \text{rate (mph)}} + \text{time intervals (minutes)}$$

PROBLEM

1. GENERAL SITUATION. *a. Maps*: See strip map. References: *Table 1*, page 62, for organic personnel and transportation; *Glossary*, page 59, for terms, definitions, and formulas.

b. Enemy: An aggressor force is 200 miles away moving to the south. Leading elements can reach HILLTOWN, 5 Nov. Enemy air active against troop columns on all routes north of HILLTOWN.


R.P
CR-X
HILLTOWN
LITTLETOWN
I.P
BIGVILLE
0 10 20 30 40
MILES
(Aporox)
N

Strip Map.

Movement Data, Infantry Regiment (Tentative)

PREPARED AND KEPT UP TO DATE BY S-3		Rifle Company (each)	Heavy Weapons Company	Battalion Headquarters Company	Total-Infantry Battalion (each)	Regimental Headquarters Company	Heavy Mortar Company	Heavy Tank Company
1		2	3	4	5	6	7	8
1	T/O Changes							
2	T/O Strength (Officers and Enlisted Men) (b.)	209	156	114	897	274	183	143
3	Personnel Who Normally Ride (d.)	18(a)	95(a)	68(a)	217	231	183	143
4	Personnel Who Normally Walk	191	61	46	680	43		
5	To Motorize (With Company Unity) (2½ Ton—LWB)	8	3	2	29(c)	2		
6	Organic Vehicles:							
	¼ Ton Trucks	2	13	9	28	29	23	2
	¾ Ton Trucks		3	1	4	1		1
	1½ Ton Trucks			3	3	5	8	
	2½ Ton Trucks	1	1		4	2	8	1
	Tanks, (M-26)							20
	Tanks, (M-45)							2
	Vehicle, Armored (M-44)							1
	Vehicle, Tank Recovery (M-32)							1
7	Total Vehicles	3	17	13	39	37	39	28
8	T/E Changes (Vehicles)							

(a) Estimated ten (10) men (administrative and mess) from each of these units will normally ride on service company organic transportation.

(b) Figures in parentheses ( ) are included in totals shown for next higher unit but do not represent total of complete unit.

(c) The assistant battalion surgeon and four (4) men from battalion medical platoon walk in rear of battalion foot column. Fifteen (15) men of this platoon are rifle and heavy weapons company aid men; assigned, four per rifle company, three per heavy weapons company. Sixteen (16) men of this platoon ride on organic ¼-ton and 1½-ton trucks. The battalion surgeon moves with the battalion commander's party.

CHART 1.

Service Company (e)								Medical Company (c, e,)		
Transportation Platoon:										
Battalion Section, Transportation Platoon (each)		Headquarters Company Section	Heavy Mortar Company Section	Heavy Tank Company Sections		Truck Maintenance Section	Total—Service Company	Battalion Medical Platoon (each)	Total-Medical Company	Total—Regiment
Kitchen and Baggage	Ammunition			Supply	Maintenance					
9	10	11	12	13	14	15	16	17	18	19
(6)	(3)	(1)	(9)	(16)	(9)	(19)	187	(37)	214	3,692
(6)	(3)	(1)	(9)	(16)	(9)	(19)	166	(17)	154	1,528
							21	(20)(c)	60	2,164
							1		*	90 *
				(1)		(1)	10	(1)	14	162
					(1)		3			17
							1	(1)	6	29
(5)	(2)	(1)	(5)	(10)	(2)	(2)	46		3	72
										20
										2
										1
										1
(5)	(2)	(1)	(5)	(11)	(3)	(3)	60	(2)	23	304

(d) In computing "personnel who normally ride" first consideration is given to the organic load of the vehicle, i.e. equipment, weapons, ammunition. After this prescribed load is ascertained personnel are loaded within the rated capacity of the vehicle.

(e) In breakdown of service company only the transportation platoon is shown in detail. In breakdown of medical company only the battalion medical platoon is shown in detail.

(*) Add three (3) 2½-ton trucks to this figure when the medical company moves as a complete unit.

CHART 1. (cont'd)

c. Friendly: 1st Infantry, 1st Division is in bivouac in vicinity of BIGVILLE (see strip map). 010800 Nov, a warning order was issued to the 1st Infantry directing its movement by motor during night, 2-3 Nov, to an assembly area in the vicinity of HILLTOWN for purpose of preparing for an offensive with the remainder of the 1st Division.

2. SPECIAL SITUATION. *a.* The operation order covering details of the move was received later in the day, 1 Nov. Extracts from the division march order pertinent to planning the move are as follows:

(1) Complete the move by 030700 Nov.

(2) Light Line—CR X (beyond this line vehicles must move without lights).

(3) Formation—Open column (176 yards per truck or density of 10 per mile).

(4) Restrictions—(a) Daylight movement on road beyond LITTLETOWN is restricted to advance party.

(b) Armored column will cross CR X from 1600 to 2157 on 2 Nov.

(5) Traffic control—(a) Regiment will coordinate necessary traffic control and route marking without assistance from division.

(b) Double-banking is prohibited.

(6) Initial point (IP)—see Strip Map.

(7) Regulating point (RP)—see Strip Map.

(8) Requirements for extra transportation should be sufficient to maintain company unity. One *spare* truck for each 25 trucks requisitioned, or major fraction thereof, should be included.

(9) Distances—IP to CR X, 105 miles; IP to RP, 130 miles.

(10) Rates (night)—(a) Vehicles: 25 mph to CR X; 15 mph beyond CR X.

(b) Tanks—15 mph to CR X; 10 mph beyond CR X.

(11) Safety factor—15 minutes at CR X.

b. The 1st Infantry SOP specifies the following attachments to battalions and separate companies:

(1) From Service Company—(See Table 1.)
Bn Sect, Trans Plat to 1st Bn
Bn Sect, Trans Plat to 2d Bn
Bn Sect, Trans Plat to 3d Bn
Hq Co Sect, Trans Plat to Hq Co
Hv Mort Co Sect, Trans Plat to Mort Co
Hv Tank Co Sects, Trans Plat to Hv Tank Co
(2) From Medical Company—(See Table 1.)
Bn Med Plat to each Bn.

c. 1st Infantry is at T/O&E strength in personnel and vehicles (See Table 1.) This table had been kept up to date by S-3 based on information furnished by S-1 and the regimental motor officer.

d. Commanding Officer, 1st Inf, decided to have the Tank Company follow the regiment as a separate serial.

3. FIRST REQUIREMENT. *a.* As Regimental S-3, compute the total number of personnel who normally walk in an infantry regiment as a basis for truck requirements. (See Table 1.)

———(1) 2,164
———(2) 1,528
———(3) 2,040
———(4) 3,692

b. As Regimental S-3, indicate the number of trucks (2½-ton, LWB) you would request in addition to organic transportation, to move personnel who normally walk. (See Table 1.)

———(1) 94 (2½-ton, LWB)
———(2) 87 (2½-ton, LWB)
———(3) 60 (2½-ton, LWB)
———(4) 100 trucks (2½-ton, LWB; 2½-ton, SWB; 1½-ton)

NOTE: (1) Under each part of the following three requirements, check *one* answer.

(2) Make free use of Table 1 for data on personnel and transportation.

(3) Before solving any problems in Requirements 2 and 3 check terms, definitions, and formulas in the Glossary.

c. As regimental S-3, indicate the total number of vehicles of all types in the regimental column (including borrowed trucks). (See Table 1.)

———(1) 304
———(2) 356
———(3) 398
———(4) 394

d. As regimental S-3, indicate the approximate time for dispatch of the advance party.

———(1) By 021000 Nov
———(2) By 021600 Nov
———(3) By 011000 Nov
———(4) 3 hours ahead of main body on 2 Nov.

e. Indicate your choice of the following which has least to do with function of the advance party.

———(1) Traffic control
———(2) Pioneer work
———(3) Quartering
———(4) Route reconnaissance and marking

4. SITUATION, CONTINUED. The regimental SOP specifies that the regimental column (less Tank Company serial) be organized into 18 march units and 5 serials. The Regimental S-3 determined the time interval between march units to be 5 minutes; between serials, 10 minutes.

5. SECOND REQUIREMENT. *a.* There is a maximum of 25 vehicles in the longest march unit. Would you, as regimental commander, reduce the time intervals which were computed by S-3? (Read the definition of *minimum time interval* in the Glossary before checking an answer.)

———(1) Yes
———(2) No

b. Why or why not? (Remember, the rate of march is reduced at the light line.)

c. What is the *road space* of the column (less Tank Company serial) at 25 mph?

———(1) 43.75 miles
———(2) 79.35 miles
———(3) 35.60 miles
———(4) None of the above are within 10 miles of correct road space.

d. What is the *road space* of the column (less Tank Company serial) at 15 mph? (Column will absorb minimum time interval at CR X.)

———(1) 44.85 miles
———(2) 35.60 miles
———(3) 9.25 miles
———(4) None of the above are within 10 miles of correct road space.

e. What is the time length of the column (less Tank Company serial) at 25 mph?

———(1) 1 hour, 10 minutes
———(2) 3 hours, 11 minutes
———(3) 6 hours, 12 minutes
———(4) None of the above are within one-half hour of correct time length.

f. What is the length of the column (less Tank Company serial) at 15 mph?

———(1) 1 hour, 52 minutes
———(2) 6 hours, 12 minutes
———(3) 3 hours, 0 minutes
———(4) None of the above are within one-half hour of correct time length.

6. SITUATION CONTINUED, The above computations were made and/or corrected by S-3. He computed the time length of the Tank Company serial to be 26 minutes at 10 mph and 22 minutes at 15 mph. In discussing the details of the plan for movement of the regiment, the regimental commander asked the following questions. As S-3 indicate your answers:

7. THIRD REQUIREMENT. *a.* What is the earliest time the head of the regimental column can reach the Initial Point (IP) and not violate restriction at CR X?

———(1) 021527 Nov
———(2) 021512 Nov
———(3) 021815 Nov
———(4) 021800 Nov

b. What time will the regiment (less Tank Company serial) complete the move? (Clear the RP)

———(1) 030620 Nov
———(2) 030252 Nov
———(3) 030452 Nov
———(4) None of the above times are within one-half hour of correct time.

c. What time will the Tank Company serial complete the move (clear the RP)?

———(1) 030631 Nov
———(2) 030605 Nov
———(3) 030717 Nov
———(4) None of the above times are within one-half hour of correct time.

SOLUTIONS
(Total Weight, 100 Points)

Your Score

Requirement 1*a*. (Wt 2)
Answer — (1)

..... From Table 1: Personnel who normally walk; 2,164 (Column 19, Line 4).

Requirement 1*b*. (Wt 3)
Answer — (1)

..... From Table 1: 94 Trucks (2½-T, LWB) required.

Three Bn (29 per Bn)	(Column 5, Line 5)	87
Regt Hq Co	(Column 6, Line 5)	2
Sv Co	(Column 16, Line 5)	1
Spares		4
TOTAL (column 19, line 5 plus 4 spares)		94

Requirement 1*c*. (Wt 5)
Answer — (3)

..... From Table 1: 398 vehicles in the regimental column.

	Organic	*Nonorganic*
1st Bn plus Sv & Med	48	29
2d Bn plus Sv & Med	48	29
3d Bn plus Sv & Med	48	29
Hq Co plus Sv	38	2
Med Co (—)	17	0
Mort Co plus Sv	44	0
Sv Co (—)	19	1
Spares		4
Tank Co plus Sv	42	0
	304	94

Total in column 398

Requirement 1*d*. (Wt 3)
Answer — (3)

..... The advance party should be dispatched as soon as practical after the warning order has been received. The S-3 will need detailed information concerning the route, distances, obstructions, suitable rates over different parts of route, number of guides, guards, and road markers needed, and amount of pioneer or engineer work required along the route or in the new bivouac area. The above function may well come within the duties of a *reconnaissance group* of the advance party commanded by the I & R Platoon leader. Dispatch of this group should be within 45 minutes after receipt of the warning order. The primary function of the advance party is that of quartering. The *quartering group* is composed of communication personnel, an officer from each battalion (Bn S-1), a noncommissioned officer from

each company of the regiment, and a medical representative. This group is usually commanded by the regimental S-1. Its dispatch should be made so as to allow three hours of daylight reconnaissance in the new area, however this is not always possible. The time that the move is to be made and the time that is required to assemble this group at the regimental CP are factors which influence the time of dispatch. The S-1, at least, should move ahead with the reconnaissance group so as to coordinate the work on routes leading into the new area and prepare a plan for suballoting areas to the battalions and unlettered units.

Requirement 1*e*. (Wt 2)
Answer — (1)

..... Actual traffic control is effected by commanders of march units and serials in compliance with the regimental order. Division must see that priority on the route is given to the 1st Infantry. Double banking must be prevented by commanders on the ground. At critical points along the route, the Regimental Security Platoon should be used to direct traffic and prevent outside traffic from interfering with movement of the column. Guards detailed from the companies will be needed to reinforce the Security Platoon since MP support will not be furnished by division.

Requirement 2*a* & *b*. (Wt 15)
Answer — (2)

..... The purpose of this requirement is to emphasize the necessity for allowing the proper time intervals between march units and serials. If minimum time interval is not computed, or time interval is based on guesswork, march units and serials will close completely when the column is required to reduce its speed at points along the route of march. *S-3 must select (by ground reconnaissance if possible) the place where the rate of march will*

be reduced most. Based on this information, he will recommend a time interval *(minimum time interval)* which will allow successive march units to maintain a normal rate until each *actually reaches* the obstacle where it is required to slow down (CR X in this problem). It should be understood that minimum time interval is applicable to *open column* and not *close column* formation (see Glossary). In close column the distance between vehicles varies with the speed (approximately twice the speedometer reading in yards). In open column the distance between vehicles is prescribed and theoretically does not vary.

The regimental commander would not change the plan because S-3 has considered the fact that sufficient time must be allowed between elements in the column to keep them from slowing before reaching CR X. Minimum time interval was computed as follows:

1. Number of vehicles in longest march unit is 25.
2. Reduction of rate at light line is from 25 to 15 mph.
3. Time length of the longest march unit at reduced rate minus time length of the longest march unit at normal rate equals *minimum time interval, i.e.;*

a. Time length (at reduced rate)

$$= \frac{\text{No vehicles} \times \text{No minutes}}{\text{density} \times \text{rate (mph)}}$$

$$= \frac{25 \times 60}{10 \times 15} = 10 \text{ minutes}$$

b. Time length (at normal rate)

$$= \frac{25 \times 60}{10 \times 25} = 6 \text{ minutes}$$

c. Min TI $= a - b$;

$$= 10 - 6 = 4 \text{ minutes}$$

Remember, S-3 computed 5 minutes and 10 minutes as time intervals between march units and serials. It has been determined that 4 minutes of this time will be the minimum time interval. A minimum time interval of four minutes will result in march units closing at CR X to *one minute* between march units and *six minutes* between serials. The commander could eliminate part of this "left-over" time interval; however, it is felt that at least one minute is necessary between march units and more time between serials. This gap will serve to further prevent accordion action as well as unnecessary slowing of march units in the column during unforeseen halts.

$$\frac{\text{Requirement 2}c.\ (\text{Wt } 10)}{\text{Answer} — (2)}$$

..... Road space of the column (less Tank Company serial) at 25 mph is computed as follows:

No Vehs = 398 minus 28 (Tk Co) minus 14 (Tk Co Sect from Sv Co) = 356.

$$\text{RS} = \frac{\text{No Vehs}}{\text{Density}} + \left(\text{R (mph)} \times \frac{\text{TI* (min)}}{60}\right)$$

$$= \frac{356}{10} + \left(25 \times \frac{105}{60}\right)$$

$$= 35.6 + 43.75$$

$$= 79.35 \text{ miles}$$

$$\text{*TI} = \begin{cases} \text{No Mu} — 1 = 17 \\ \text{No Ser} — 1 = 4 \times 10 = 40 \\ \text{MU Gaps} = 13 \times 5 = 65 \end{cases}$$

Total TI = 105 mins.

Requirement 2*d*. (Wt 10)
Answer — (1)

..... Road space of the column (less Tank Company serial) at 15 mph after minimum time intervals are absorbed is computed as follows:

$$RS = \frac{356}{10} + \left(15 \times \frac{TI^*}{60}\right)$$

$$= 35.6 + \left(15 \times \frac{37}{60}\right)$$

$$= 35.6 + 9.25$$

$$= 44.85 \text{ miles}$$

$$^*TI = \begin{cases} \text{No Mu} - 1 = 17 \\ \text{No Ser} - 1 = 4 \times 6 = 24 \\ \text{MU Gaps} = 13 \times 1 = 13 \end{cases}$$

Total TI = 37 mins.

Requirement 2*e*. (Wt 10)
Answer — (2)

..... Time Length of column (less Tank Company serial) at 25 mph is computed as follows:

$$TL = \frac{RS}{R} = \frac{79.35}{25}$$

= 3.17 hours, or *3 hours, 11 minutes.*

Requirement 2*f*. (Wt 10)
Answer — (3)

..... Time Length of column (less Tank Company serial) at 15 mph is computed as follows:

$$TL = \frac{RS}{R} = \frac{44.85}{15}$$

= 2.99 hours or, 3 hours (Note fraction of minute carried to next higher minute.)

Requirement 3*a*. (Wt 10)
Answer — (4)

..... The head of the regimental column should reach the IP at 1800:

		Hrs	*Min*
(a)	Restriction at CR X until 022157 Nov	21	57
(b)	TD, IP to CR X (105 mi at 25 mph)	4	12
(c)	(a) — (b)	= 17	45
(d)	Add safety factor		15
(e)	Then IP time is (c) + (d) or 021800 Nov.	= 18	00

Requirement 3*b*. (Wt 10)
Answer — (2)

..... The tail of the regimental column (less Tank Company serial) will clear the RP at 030252 Nov; *(IP time + travel time + time length at slow rate = completion time.)*:

		Hrs	*Min*
(a)	Head reaches IP at 021800 Nov	18	00
(b)	TD, IP to CR X (105 mi at 25 mph)	4	12
(c)	TR, CR X to RP (25 mi at 15 mph)	1	40
(d)	TL column at slow rate	3	00
(e)	Then Column will clear the RP at (sum of above) or 030252 Nov.	26	52

Requirement 3c. (Wt 10)
Answer — (3)

..... The tail of the tank serial will clear the RP at 030717 Nov.

	Hrs	*Min*
(a) Head of motors reaches IP at 021800 Nov	18	00
(b) TL, motors at normal rate	3	11
(c) TI, between tail of motors and head of tanks		10
(d) Head of tank serial reaches IP, 022121 Nov	21	21
(e) TD, IP to CR X (105 mi at 15 mph)	7	00
(f) TD, CR X to RP (without lights, 25 mi at 10 mph)	2	30
(g) TL, Tank Company serial at slow rate		26
(h) Then tail clears RP at or 030717	31	17

..... Your total score. (Note: Make no deduction for minor mathematical errors.)

Score	*Rating*	YOUR RATING
98-100	Fine	Test others and see if they can equal your exceptional score.
88-97	Good	You can plan a movement of this type with a minimum of error.
78-87	OK	Now locate your errors. Consider how they would affect actual execution of such a movement. A clear understanding paves the way for further study.
68-77	Average	You have, perhaps, made many moves of this type but never given too much thought to planning the move. Rework this problem or set up one of your own.
Below 68	You didn't try too hard.	When you are faced with the actual planning of a movement and you guess as you did here, execution of your plan may be passable *one* out of *twenty* times.

DISCUSSION

This brief problem has covered only part of the planning phase of a motor movement. Whether the S-3 approaches the problem of planning the movement of his regiment in the same manner as described herein is of comparative unimportance, however, his considerations should certainly cover the basic factors which this problem contains. The tactical situation facing this regiment when it reaches the new bivouac area may dictate the necessity of sending the Tank Company ahead of the main body by infiltration during daylight on the 2d of November. A unit moving in *open column* as this one did extends over most of the route and consequently is more difficult to control, especially during darkness. The initial reason for moving in open column was to take advantage of the passive air protection the formation affords.

The regimental commander, by use of these preliminary figures, has the following general picture as a basis for correction of his march order:

First: The column is extremely long and will be difficult to control and guide during night without loss of men and vehicles.

Second: The purpose of moving at night is defeated since the Tank Company reaches the new area after daylight.

The error is a common one. The 1st Infantry *cannot* complete the move by 030700 Nov. Higher headquarters has failed to recognize the capabilities of an infantry regiment by restricting its movements to open column with a prescribed density (slightly less than 200 yds per truck). Under the provisions of the division order the regimental commander is obliged to execute his march along the plan indicated in the problem. However, he should report these facts to the division commander and recommend that the following be considered:

First: Take a calculated risk by closing the column to a density of 20 trucks per mile (88 yds per truck).

Second: Arrange for movement of the Tank Company ahead of the regimental column by infiltration during daylight of 2d November.

This problem is based on the assumption that the method of execution is of secondary concern in the beginning. The regimental commander is interested in knowing what the order from division requires of his regiment and what he must do to comply with this order. How he organizes his column, execution of the movement to and beyond the IP, traffic control enroute, and occupation of the new area will be of concern in the next phase.

CONCLUSION

The business of moving troops is a major problem. Our successes during World War II cannot be overlooked; however, it must be realized that we were usually the pursuer and not the pursued. Our superiority in the air and in vehicles and equipment permitted movement by hit-or-miss methods initiated by a warning order such as, "You will be prepared to move to 'X' at daylight***It is almost daylight***Move out." which usually resulted in the unit reaching "X", but hours late and strung out along the entire march route.

On many occasions troops will be required to move on short notice, or no notice at all. However, it is emphasized that staff officers and commanders can alleviate many of the difficulties inherent to a motor move by a knowledge of the capabilities of the men and machinery. In military science there is no short cut to prior planning nor substitute for sound judgment. Only sound judgement and experience will result in a complete understanding of the factors which exert the ultimate influence on logistics—time and space.

Personnel Adjustment—A Command Function

*This is the second part of a two part discussion on the subject of mental adjustment of Army personnel. Part I (*INFANTRY SCHOOL QUARTERLY, *October, 1947) contained a discussion of the complex patterns of human behavior. Part II is a discussion of the factors which may lead to maladjustment of personnel and the preventative measures which can be effected at the command level.*

Fifty per cent of all psychiatric casualties in the Army during the War years 1942-1945 occurred within thirty days of the date of induction or enlistment of the individual. Apply this factor to the total one million men who were admitted to Army hospitals for some form of psychiatric disorder during the war and it becomes evident that one-half of a million individuals are involved—more men than are employed by the entire steel fabricating industry—more men than reside in St. Louis, San Francisco, or Pittsburg. Add to this disaster the fact that 350,000 more men were discharged for psychiatric reasons within the first six months of Army service and the gravity of the situation becomes even more apparent. The problem is crystal clear; unfortunately, the solution is neither obvious nor easily attainable. But there is a solution—or at least a near solution. Much of this waste of manpower with its attendant ill effects can be avoided.

Simply stated, psychiatric casualties are usually maladjusted individuals; maladjustment results from failure to adjust to a changed environment. The solution is to provide a *mental hygiene* program which will indoctrinate the individual and thus provide a cushion for the emotional shock which accompanies the change of environmental factors.

This simple statement of the problem and its solution, however, does not indicate the complexity of the problem nor the difficulties attendant to its solution. The solution itself involves the additional problem of providing active *leadership* at the basic command level—informed leadership, objective in scope and in application—leadership that includes a knowledge of human behavior and frailties—in short, leadership that is capable of managing human beings.

In order to examine the problem objectively and thus determine the requisites of informed leadership, consider the case of a mythical inductee, Bill Smith. Bill is essentially a normal individual with some introvert tendencies. He is gregarious in nature, essentially honest, not quite emotionally mature (like most young inducted or enlisted men), and will *probably* become a good soldier.

Bill lives in the small town where he was born and reared and is just as much a part of the community as the village clock in the town hall. He knows everybody and everybody knows him. Bill is married to his home-town sweetheart and is justifiably proud of his new importance in the community as a family man and substantial citizen. His job at the factory has assumed a new significance—it is now a stepping stone to bigger and better things for his family and himself. The "Hi Neighbor" attitude of the community is much to his liking; he is interested in its political activities and is active in the local social clubs. Bill Smith belongs right where he is for he is happy. Consequently, he views his induction into the Army as "unfortunate," to say the least.

Before his induction there were few frustrations or annoyances in Bill's daily life. If he did run into difficulties in his work, his sympathetic wife was eager and willing to listen to his troubles, supplying him with a safety valve for his pent-up emotions. There is quite a difference between his life as a civilian in his home town and that now facing him as a soldier in the Army. Gone are the familiar surroundings, the familiar faces, the familiar routine of his factory job. Gone too, is the comfort afforded him in talking over his troubles with his sympathetic wife—he has

lost the safety valve that allowed him to relieve his emotions on the days when things were not going too well. He is now referred to as Smith rather than Bill Smith, or as a serial number. The serial number seems to represent his only entity, and as he memorizes it, he worries about becoming a "number" and thus losing his identity.

At the outset of Bill's indoctrination into the Army, his contact with officer personnel is limited to those whose impersonal efforts are directed toward processing, screening, and clothing him. He is just a name and a serial number to them, and conversely, they appear as nonentities to him. Therefore, when he is assigned to a training unit and becomes subject to unit discipline and direction, his officer relationship assumes a new and formidable significance. Now he is made to realize his complete lack of choice, preference, and opinion in almost everything except religion. He eats meals in mess halls, possibly out of a mess kit, or eats field rations without choice of diet. He works at whatever task is assigned him without any preference other than that predetermined by his physical or mental capabilities. He obeys orders from men he sometimes personally dislikes or resents and is bound by irrevocable subordination to officers who remain aloof and entirely impersonal both in their judgement and direction. Perhaps soldier Bill Smith is even unfortunate enough to have an officer in his unit who regards his command as a prerogative rather than a responsibility, using his position to drive men rather than to lead them. In such a situation it is only reasonable to believe that newly-inducted Bill Smith will resent this type of leadership.

Classification and assignment of Army recruits was a complex problem in World War II, and resulted in a proportion of the dissatisfaction and resentment expressed by personnel. Bill's resentment to Army life may be further heightened by the not uncommon improper job assignment. Consider Bill's bewilderment when, with excellent qualifications as an amateur radio operator in civilian life, he is improperly classified and assigned as a truck driver. Imagine, too, his righteous indignation each day as he drives

the truck around the Post, passing a communications school where hundreds of inductees are trying to learn the intricacies of radio communication and repair.

If Bill is made aware of the fact that it is impossible for the commander to place everyone in the job they prefer, if he can be shown, as in many instances, that the unit Table of Organization does not contain the job for which he is best suited, if he can be assured that every effort will be made to place him in the proper job, a great deal of the sting will be taken out of his resentment. Just to know that the commander is aware of his qualifications will certainly make him feel that he is not forgotten.

Regardless of the suitability of Bill's job assignment however, his relationship with the commissioned officers is at first, a new and sometimes strange situation. His attitude toward them is similar to his attitude toward former civilian bosses only insofar as his recognition of their representative authority—beyond this, similarity ends. Where once he had the comfortable feeling of being backed up in his relations with his bosses by labor unions and civil labor relations boards, he now feels that he is entirely alone and without recourse against the action or judgement of an all-powerful force. Bill may also fail to see any similarity between Army and civilian promotion systems, for where civil promotions were made at the discretion of the boss, the Army prototype is restricted by a Table of Organization controlled by a higher echelon. Naturally, Bill will be further confused and resentful if the commander fails to make promotions within the limitations of this mysterious T/O in a fair and unbiased manner.

To inductee Bill Smith, the term "discipline" has an ominous sound. Being fresh from civilian life where it is usually associated with punishment, his antipathy is understandable. After all, Bill Smith is the average American citizen who enjoyed the prerogative of expressing his political and economic views in any manner he desired. Wasn't it his constitutional right—one of his cherished "four freedoms"? Although Bill still has all of his constitutional

rights in the Army, he must exercise them in a certain prescribed manner, and therefore may feel that he does not have them at all. If Bill is unfortunate enough to come in contact with a commander who believes that discipline is represented by a cowed state of subservience on the part of enlisted personnel, Bill's misconception of discipline might well become a conviction that will ruin his potential worth to the Army.

Part of the many problems confronting Bill Smith may have a causative basis in his ideology. In the formative years of his childhood, his parents constantly instructed him in the quality of kindness. He vividly remembers the times he was punished for kicking the family cat, throwing rocks at the neighbor's dog, or shooting birds with an air rifle. And he well remembers the times he was severely lectured or thrashed for beating the boy next door in a burst of temper. Purely childish behavior, no doubt, but each resulting in some lesson learned of the attributes of kindness. Later, as he became older and joined the Boy Scouts, he was taught to cherish kindness as the embodiment of nobility. In school, Bill learned about sportsmanship, and he was taught to play fair in all athletic competition. For 18 or more years, kindness and sportsmanship were drilled into his mind. Therefore, it is not strange that he views the grim fact that as a soldier he must "kill or be killed" with no little distaste. The combat training he receives in the Army requires him to forget overnight, so to speak, the years of training in sportsmanship and kindness which he received from his family, his school, and his church.

In addition to the conflict created in Bill's mind concerning the necessity for killing other human beings, the fact that he too may be mutilated or killed in combat creates an emotional upset. Bill, like so many others who are unfamiliar with casualty statistics, may be convinced that war is a terrific slaughter in which most of those engaged will die.

Mythical Bill Smith also may be affected by the changes in his physical environment. Before entering the Service he lived in a nice comfortable home in a pleasant location

of his own choice in his home town. The heating system of his home was regulated by a simple twist of a dial. From childhood Bill was taught modesty in his daily habits and that it was not proper to have a gathering around him while he performed his daily body functions. The food he ate was entirely at his selection, either in tasty home cooked meals or from attractive restaurant menus. There is little comparison to the conditions he now faces in the Army. Here he sleeps in unadorned barracks with some thirty or more men, sharing the bathroom and showers with them, and eating his meals with two hundred or more strangers. He is no longer consulted about what he desires to eat, either eating what is prepared for him or doing without. In the field, he sometimes does not get three hot meals a day, eating cold field rations instead. He is also required to sleep outdoors in all kinds of weather, and many times he will be required to stay awake all night. He can not regulate the weather around him and must bear the rigors of snow, cold, rain, and ice. Every one of these physical changes may be definitely unpleasant to Bill Smith, but he must learn to live with them; he can not escape them because the threat of punishment by court-martial hangs over his head. If Bill happens to be one of those shy reserved individuals with introvert tendencies, the shock resulting from the changes in his physical environment will be very great.

Among newly-inducted Bill's most outstanding problems, fear is perhaps the hardest to explain or dispel. The reason is that the instinct of fear is badly misunderstood by Bill and the great majority of laymen. Ordinarily, if the remark is heard that a certain man is afraid, it is habitual to associate derogatory words with that particular person. If a person admits that he is afraid he is labeled a coward and condemned as being "yellow." The idea is thus implanted that fear and cowardice are one and the same. Those with combat experience know that such an idea is fallacious. *Every soldier is afraid while in combat.* The degree of fear in individuals may vary but the instinct is always present. Holders of the highest combat decorations have been heard to state that they were never more scared in their life than

on the day they won the decoration. Bill, however, does not know these facts. He still associates fear with such unpleasant words as "coward" and "yellow." Unless fear is explained and he is assured that everyone is afraid and that a man with controlled fear is better prepared to fight than the man who is not afraid, Bill will be worried because he is afraid that he is going to be afraid when he enters combat.

The complexity of Bill's struggle to adjust himself to Army life is also aggravated by the lack of group influence. At home, he was gregarious by nature and belonged to local social, civil, and religious groups where he enjoyed the company of others. Unless Bill is assigned without delay to a unit where he will be identified with a group he may suffer acutely from a feeling of insecurity. Otherwise, Bill's strong herd instict will be denied, and he will feel alone and insecure, for although he may still attend a church of his own choice, or seek entertainment at the Post Service Club, he will be unidentified in a group of strangers. That feeling of security which he derived from *belonging* to a group will be missing. Most important of all, he will no longer have the influence of the family group on Sundays or other special occasions.

Bill Smith's varied and complex problems of adjustment are the same ones which proved too much for one million Army personnel during the years 1942-1945. Of the men hospitalized for psychiatric disorders, 380,000 were discharged as unfit for further service. Add to this astounding figure some 72,000 general prisoners whose behavior stemmed from psychiatric disorders and the full impact of the necessity for competent preventative measures is tragically indicated. What of the thousands of Bill Smiths now entering the service? Are they to contend with the problem of adjustment unassisted? If not, who then, is responsible for taking adequate measure to effect normal adjustment of Army personnel?

FIXING RESPONSIBILITY

Erroneous ideas concerning the responsibility for the solution to proper mental adjustment has led many officers

to believe that the entire burden rests with the medical officer. Actually, the responsibility rests *within* the unit chain of command, concerning the medical officer only slightly more than it does the platoon leader, the company commander, and so on up to the unit commander, upon whom rests the *responsibility for delegation* of preventative and curative efforts concerning mental adjustment within the entire command. Therefore, the unit commander is responsible for the proper mental adjustment of personnel in his command in the same sense that he is responsible for the operation of the unit mess and supply facilities.

THE SOLUTION

Because a unit commander is invested with the authority to dictate the terms and conditions of military life to a large group of men, *leadership* is the prime factor which determines whether an individual makes a satisfactory adjustment to his new environment. Under the direct influence of good leadership, most enlisted men adjust satisfactorily to discipline and training, consistently maintaining good appearance, good conduct, and high morale. The truth of this statement has been substantiated time and time again by the fact that troops who have responded brilliantly under one commander, have subsequently displayed miserable disorganization under the command of another. How can this be so? Simply because, it must be assumed, the successful commander was capable of *human management* where the other was not. The first commander realized that his men were not simple robots responding to given stimuli, but were individuals of complex temperaments or personalities, and exerted the necessary quality of leadership to arouse, inspire, and direct them to the pitch necessary to carry out his plans. In the final analysis, the commander who cultivates and develops *human management* in his relations with subordinates, has the key to the solution of the problem of maladjustment.

Human management includes the ability to evaluate the frailties of human beings when subjected to military regimentation. A good leader will realize that although the military problem may be a simple pattern for the application

of physical force in a geometric direction, the most difficult problem lies in accurately estimating the spirit or day by day changes in the mood of the troops. Individual personalities fluctuate from day to day, although, like the compass needle, they always point one way. But, also like the compass needle, they can be deflected by outside factors for a time. The good leader, possessing the ability of human management, will be able to judge what is causing the deflection and take the necessary corrective action.

SIGNS OF MALADJUSTMENT

In all cases of mental maladjustment there are certain warning signals and premonitory signs which must be recognized by the commander if he is to take action to prevent the individual from becoming a mental casualty. These signs are divided into three main groups: psychological symptoms, behavior changes, and psychosomatic complaints.

Psychological symptoms include apathy and disinterest, seclusiveness, bitterness toward the Army, irritability, and tenseness and anxiety. (The latter two are evident especially under battle stress.)

Behavior changes may be evidenced in a number of ways. The most obvious manifestations are carelessness in appearance, response, and execution of orders; passive resistance to orders, shirking, dragging behind, and sluggishness; lowering of standards of habits, including excessive use of alcohol, tobacco, profanity, and actual dereliction of duty.

Psychosomatic complaints and symptoms include headaches, palpitation, vertigo, sweating, loss of appetite, sleeplessness, and numerous other aches and pains involving the entire body for which no organic basis can be found.

All of the above are warning signs of *individual maladjustment*. If they are not recognized in the incipient stage when corrective action can be effected, they may eventually infect the entire unit. Early signs of *group maladjustment* may be recognized by general lack of interest, response through fear rather than pride, poor inspection reports, and poor attitudes expressed and displayed toward training.

The late signs of group maladjustment within a command are indicated by an alarming increase in the AWOL rate,

sick reports, the company punishment rate and the guardhouse population.

CORRECTIVE ACTION

By making certain appeals to the individual's personality, the commander can sometimes successfully dispel the newly-inducted or enlisted man's resentment toward the Army. Thus the initial step toward adjusting the individual is made through an appeal to his conscience, ego, or instincts. Each of the following measures represents an appeal to the personality portion of the mind and should be included in a mental hygiene program:

Explanation of the "why" is simply an explanation of the strange situation which confronts the inductee. This explanation may be accomplished by an open discussion of subjects such as regimentation, intrusion of privacy, psychological approaches toward fear, and the effect of loss of group influence and home environment. The average American soldier possesses sufficient intelligence to understand the"why" of Army conditions if they are properly explained. Not only does he want to be instructed in such things as marksmanship but he desires to know why he must give up certain personal prerogatives while in the Service. He also wants to know why he is required to sleep in foxholes and eat cold rations in combat, even as he wants to know why he must march 25 miles in 8 hours.

Combat indoctrination is the presentation of what may be expected in combat. If properly indoctrinated, the soldier will enter combat mentally fortified against its potential ill effects. He will know the true ratio of wounded to killed in battle casualties, and know that he stands a good chance of returning unscathed. In this sense, indoctrination is closely associated with explanation of the "why" and fits the training pattern. The American soldier ordinarily will do anything asked of him, but he prefers to be told exactly what he should expect before he starts on his mission. The commander should not minimize the danger confronting the soldier—understatement of the danger involved only leads to resentment when the soldier learns the truth.

Adoption of consistent attitudes by the commander under all circumstances will appeal to all individuals. The"weather vane" type of commander, full of indecisions and inconsistencies, has a very disturbing effect on the moral of soldiers. The effect of indecision is not only bad in training, but in combat it might spell the difference between victory and defeat. Consistent attitudes concerning awards, punishment, passes, leaves, and promotions are essential if the appeal to the soldier's conscience is to be successful.

Display of adequate knowledge of the subject is an important appeal to the conscience. Obviously the officer must have complete and thorough tactical and technical training, for all soldiers expect their leaders to come up with the solution to military situations without hesitation. The officer is also required to know the answer to many nonmilitary questions such as: "How can I get prenatal care for my wife?" or, "What can I do about certain family problems which I am unable to solve?" In other words, soldiers will come to the commander with all sorts of personal problems. It is not possible for a commander to know all of the answers, but he must be able to guide the soldier to one who can supply the answer. The unit surgeon, for instance, can answer problems concerning medical care, while the chaplain is certainly the proper person to consult in regard to family problems.

Displaying evidence of personal interest will appeal to the ego portion of the soldier's personality by injecting a feeling of personal interest in his contacts. Personal interest in the man comprises more than just knowing his name and rank—the commander should investigate the man's background, his schooling, his personality make-up, his present family status, his ambitions, and his attitude toward Army life. It is not intended that the officer should pry into the man's personal affairs, but rather he should convey the idea that he is available to assist the soldier as a counselor.

Creation of avenues of personal gratification will appeal to all individuals. The factors to be considered by the commander under this category are comprised of such things

as proper food, adequate clothing, good living quarters, passes, paying the soldiers reguarly, relief periods in combat, proper recreation, regular mail call, and many other things too numerous to mention. These are the things that give material satisfaction—tangible things that have an immediate favorable effect.

Creation of confidence in the individual is requisite to providing a sense of security. No man wants to fight at a disadvantage. Unless the individual is convinced that he is armed with a better weapon, that his leaders are skilled, and that he himself is a better fighting man than the enemy, he will feel insecure. The commander who can convince his men that they have all these advantages, creates a feeling of confidence within the group and a sense of security within the individuals.

Appeals to the instincts are a necessary part of a mental hygiene program. There are two of them that are definitely the concern of a line officer in combat, namely, the *fear* and *herd* instincts:

Fear instinct. The commander must assure his men that fear is a normal instinct present in all individuals. He must explain that a certain degree of fear is good because it mobilizes the body for action; that when a man is afraid his heart beats faster carrying more oxygen and sugar in the blood to the brain and muscles; and that the body produces an internal secretion called adrenaline which stimulates the heart and releases more sugar (glycogen) from the liver into the blood thus providing greater physical energy. Thus it becomes obvious that a degree of controlled fear prepares an individual for combat. The soldier must then be taught that he must control fear, for if this instinct is allowed to develop unchecked it will have an adverse effect on his battle conduct, even causing him to run or hide in panic. The commander should urge his men to *acknowledge fear* and then *control it* thus utilizing its effects to move against the enemy instead of away from him.

Herd instinct. The officer also appeals to the herd instinct of the individual by making the soldier feel that he belongs to a group and is therefore not alone when he joins

the Army. The "buddy" system in the past war was an attempt to play on the herd instinct. Getting the soldier to speak of belonging to a certain unit makes him feel that he is a part of a big organization and not just a solitary individual who is expected to fight by himself. Incidentally, the soldier must be induced to associate himself with a unit as a whole rather than a small component. For example, he must not simply say "I belong to the 1st Squad," but must continue his identity with "1st Squad, 1st Platoon, Company A, 1st Infantry." Small units are sometimes entirely destroyed in combat and thus the soldier can no longer identify himself with it. Therefore, he must associate his identity with the parent unit which is seldom, if ever, entirely destroyed, and the soldier retains his identity with the unit throughout combat.

These are the fundamental points which must be included in a mental hygiene program. Many other factors, however, must be included in such a program in order to include an appeal to all individuals. Some men, for instance, who do not respond readily to an appeal to their conscience will respond favorably to an appeal to the ego; some men who cannot be moved by an appeal to the ego will respond to an appeal to the instincts. The commander must realize initially that any program designed to influence the thoughts and actions of a large group of men must be sufficiently varied to include at least one element that will have an effect on each individual in the group.

CONCLUSION

Because of the magnitude of the problem and the frequency with which it occurs, the approach to the solution must be projected on an Army-wide basis. *Every leader must have a basic knowledge of the factors which affect mental adjustment; every newly-inducted or enlisted man must be considered susceptible to maladjustment.* Mental hygiene must be made a part of the indoctrination program on the same level as sex hygiene.

It is obvious that a single commander can not inaugurate and carry out an extensive program of this type without

assistance. Like other Army indoctrination programs, the commander must function both as a coordinator and a leader in initiating and maintaining such a program. To make the program effective he should call on the unit medical officer, chaplain, and Red Cross representative as well as subordinate leaders for the necessary assistance, but he can not shift the responsibility. A commander who aspires to be a good troop leader must ever keep in mind the words of Napoleon, "There are no poor troops, only poor commanders."

The Heavy Mortar Company in Defensive Combat

Section I

COMPOSITION, ARMAMENT AND EQUIPMENT

1. COMPOSITION. *a. General.* The Heavy Mortar Company consists of a company headquarters and three heavy mortar platoons. For details of organization, armament, and equipment, see figure 1.

b. Company headquarters. The company headquarters is divided into the headquarters section, the operations and fire direction section, and the communications section.

c. Headquarters section. The headquarters section is divided into the command group and the administrative group.

(1) The command group includes the company commander, the company executive officer (reconnaissance officer), first sergeant, motor sergeant, bugler (messenger), messengers, orderlies, and truck drivers.

(a) The company commander is responsible for the training, discipline, control, administration, and supply of his company. He is also responsible for its tactical employment in conformity with orders received from the regimental commander. As a member of the special staff of regimental headquarters (regimental mortar officer), he assists the regimental commander in the development of the plan for employing the weapons of the company, and is usually required to submit recommendations to the regimental commander for their employment. He issues the necessary orders to his platoon leaders and to certain members of his command group to conform with the orders of the regimental commander. Thereafter, he continually supervises the execution of his orders.

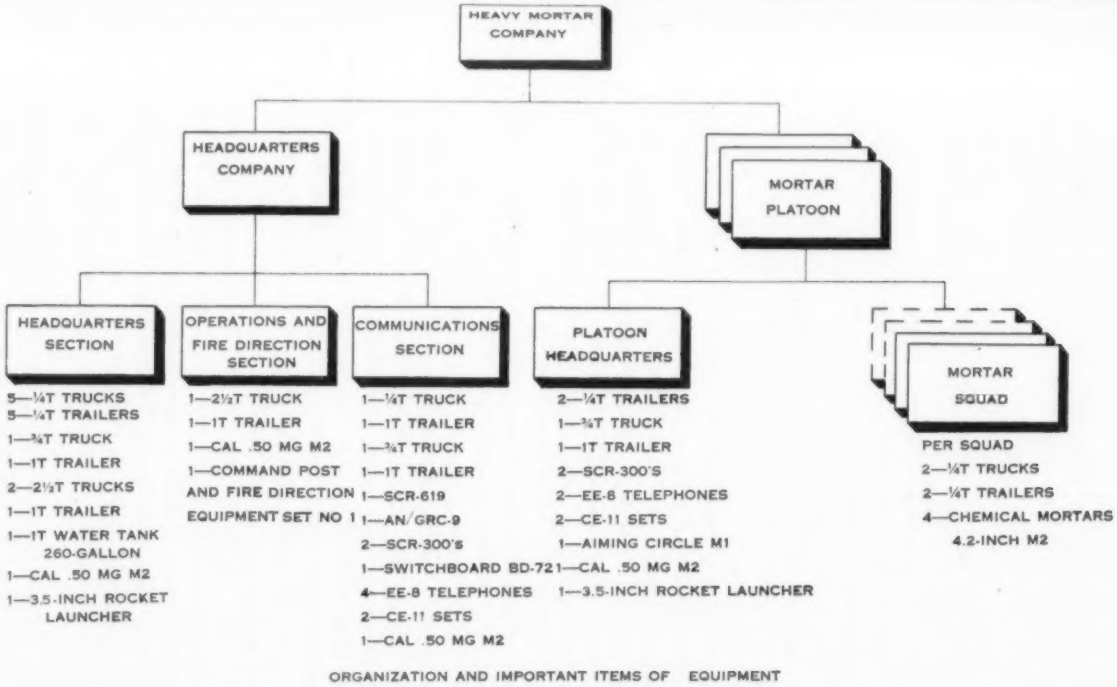

HEAVY MORTAR COMPANY
HEADQUARTERS COMPANY
MORTAR PLATOON
HEADQUARTERS SECTION
OPERATIONS AND FIRE DIRECTION SECTION
COMMUNICATIONS SECTION
PLATOON HEADQUARTERS
MORTAR SQUAD
5—¼T TRUCKS
5—¼T TRAILERS
1—¾T TRUCK
1—1T TRAILER
2—2½T TRUCKS
1—1T TRAILER
1—1T WATER TANK 260-GALLON
1—CAL .50 MG M2
1—3.5-INCH ROCKET LAUNCHER
1—2½T TRUCK
1—1T TRAILER
1—CAL .50 MG M2
1—COMMAND POST AND FIRE DIRECTION EQUIPMENT SET NO 1
1—¼T TRUCK
1—1T TRAILER
1—¾T TRUCK
1—1T TRAILER
1—SCR-619
1—AN/GRC-9
2—SCR-300's
1—SWITCHBOARD BD-72
4—EE-8 TELEPHONES
2—CE-11 SETS
1—CAL .50 MG M2
2—¼T TRAILERS
1—¾T TRUCK
1—1T TRAILER
2—SCR-300'S
2—EE-8 TELEPHONES
2—CE-11 SETS
1—AIMING CIRCLE M1
1—CAL .50 MG M2
1—3.5-INCH ROCKET LAUNCHER
PER SQUAD
2—¼T TRUCKS
2—¼T TRAILERS
4—CHEMICAL MORTARS 4.2-INCH M2
ORGANIZATION AND IMPORTANT ITEMS OF EQUIPMENT

FIGURE 1.

(b) The company executive officer who is also the reconnaissance officer, performs such reconnaissance, liaison, and administrative duties as the company commander may direct. In combat, his primary duty is reconnaissance, and when the tactical situation demands, this duty becomes a continuous function. His administrative duties will then normally be performed by the first sergeant. In his reconnaissance he generally looks for initial and subsequent firing position areas, adequate observation posts, targets, and routes for ammunition supply and displacement. In this he is assisted by the reconnaissance sergeant, messengers, and such other personnel as the company commander may designate.

(c) The first sergeant is the principal enlisted assistant to the company commander. His duties will vary widely during combat, from administrative and supply matters to command of a platoon, if casualties necessitate such replacement. He normally operates the company command post because the executive officer's reconnaissance duties often require him to be elsewhere.

(d) The reconnaissance sergeant is the chief assistant to the reconnaissance officer.

(e) The motor sergeant is responsible to the company commander for the maintenance of vehicles. During combat, he controls the movement of vehicles engaged in ammunition supply between the company ammunition supply point and platoon areas. The motor sergeant also supervises the camouflage and concealment of vehicles. He may take over the duties of the company supply sergeant when the latter is not present in the forward area.

(f) The bugler is trained as a messenger and observer. He is employed to assist the company commander and the reconnaissance officer in observation and control.

(g) All messengers are also trained as observers and may be used to man observation posts.

(h) The orderlies are trained as messengers and observers.

(i) Messengers, orderlies, observers, and the bugler may be called upon to operate a company radio and generally assist in maintaining communications equipment.

(j) The truck drivers may be used as motor messengers. In combat, they are responsible for the camouflage and concealment of their individual vehicles. They also perform first echelon maintenance on their vehicles.

(2) The administration group in the headquarters section consists of personnel whose duties and locations are as indicated:

(a) *Mess steward, cooks, and mess attendants.* The mess steward is responsible to the company commander for checking rations and water issued to the company, division of the rations into meals, supervision of the cooks and mess attendants in the preparation of the meals, and for distribution of meals to the company. Usually he and his assistants are in the regimental train bivouac, working under the direct supervision of the commander of Service Company.

(b) *Supply sergeant, ammunition sergeant, and armorer.* The supply sergeant is responsible for procuring and distributing supplies, except rations and water, and for supervision of the activities of the ammunition sergeant and armorer. During combat the supply sergeant will usually be in the forward area in order to assist the company commander in matters pertaining to supply. As the supply of ammunition is so vital in the Heavy Mortar Company, the supply sergeant has the ammunition sergeant as his chief assistant in this all-important function. The armorer will usually be located in the train bivouac where he assists in checking and distributing supplies, executes minor repairs on weapons, and performs simple carpentry tasks.

(c) *Company clerk.* The company clerk performs general clerical duties.

(d) *Automotive mechanics.* The automotive mechanics assist the motor sergeant in the maintenance of vehicles (second echelon maintenance). Two of the mechanics drive the two 2½-ton trucks assigned to the headquarters section. They generally operate either at the company command post or at the regimental train bivouac.

d. The operations and fire direction section. This section is the fire control unit of the Heavy Mortar Company. It

is commanded by the gunnery officer who also assists in the computation of firing data. To assist him in his duties he has the operations sergeant, who is second in command of the section, three computers, and one operator for the horizontal control.[1]

(1) *Fire direction.* The operations and fire direction center translates the general fire missions of higher commanders and the requests for fire by observers into firing data for the batteries. The company operations and fire direction center is located near the command post. It assists the company commander in controlling the fire of the platoons. The purpose of fire direction is to provide:

(a) Continuous and accurate fire support under all conditions of weather, visibility, and terrain.

(b) Flexibility sufficient to engage all types of targets over a wide area.

(c) Prompt massing of fires of all available units in an area when range limitations permit.

(d) Prompt distribution of fires simultaneously on numerous targets where range limitations permit.

(2) *Supporting fires.* All supporting fires, the possible need for which can be foreseen, are prearranged. This means that the location of these fires has been fixed and usually that firing data have been computed in advance to increase accuracy and expedite missions.

(3) *Tie-in with artillery.* The heavy mortars may establish communications with the artillery. When this is done the artillery observers can be used to observe fires of the heavy mortars and *vice versa.* This tie-in with artillery adds flexibility to the fires of each, as the observers and communications of each one supplements the other.

e. The communications section. The function of this section is to install, maintain and operate the company communications equipment. The company communications sergeant is the chief of the section. He has two radio

[1] A system of geographic points whose positions in a horizontal plane are accurately known—used in conjunction with other fire-control instruments for computing fire data.

operators, three radio-telephone operators, two switchboard operators, and five linemen to assist in performing the duties of the section.

f. Survey. A survey team of one officer and four enlisted men will be trained in each company. This team will usually consist of the company executive officer, the operations sergeant, and three other capable enlisted men. All platoon positions will be surveyed as soon as they are designated. If time permits the platoon position survey will be tied in with the target area survey. Sufficient equipment is issued each heavy mortar company to enable it to run a survey.

2. CAPABILITIES AND LIMITATIONS OF THE HEAVY MORTAR. *a. Concentration area.* The heavy mortar is a crew-served weapon. Each mortar is capable of firing an effective concentration in an area 100 yards in diameter.

b. Range. The range is limited by observation more than by the maximum range of the weapon. The maximum effective range of the present heavy mortar is 4,400 yards, however, a heavy mortar has been developed which has a maximum effective range of 5,000 yards and a maximum range of 6,000 yards. Heavy mortar fires should not be placed closer than 200 yards from the nearest troops.

c. Firing positions. Due to its high-angle trajectory and effective range, a wide choice may be exercised in the selection of firing positions. Advantage should be taken of deep defilade and wooded areas. Positions should be selected which protect the crew from rifle and machine-gun fire, and which reduce the chance of injury from artillery fires and air attack.

d. Targets. Suitable targets are—

(1) Known locations of enemy crew-served weapons and installations.

(2) Enemy personnel.

(3) Observed point targets, or small area targets which

are protected from fire of rifles and machine guns such as:

(a) Targets in road cuts, embankments, or entrenchments.

(b) Reverse slopes and woods, which can be used as approaches to the friendly position and which are protected from rifle and machine-gun fire. (Applicable to defensive combat.)

3. TYPES OF POSITIONS. *a. Firing positions.* The company is assigned position areas in which the mortars and personnel are to be located. They are classified as follows:

(1) *Primary position.* The firing position from which the weapon can best execute its primary fire mission.

(2) *Alternate position.* A firing position from which the same fire mission can be executed as from the primary position. It is used when it becomes necessary to move from the primary position to avoid destruction. It should be at least 100 yards from the primary position.

(3) *Supplementary position.* A firing position from which the mortar can accomplish secondary fire missions which cannot be accomplished from the primary or alternate position.

(4) *Off-carrier position.* A point at which the weapon, its initial supply of ammunition, and its accessories are removed from the weapon carriers. From that point they are brought by hand to a cover position or firing position. The off-carrier position should afford defilade and concealment for carriers and men.

(5) *Cover position.* The cover position affords defilade and concealment for members of the squad when they are not required to remain at the firing position.

4. TRANSPORTATION. *a. Tactical employment of company transport.* (1) The heavy mortar company is assigned sufficient motor vehicles for the purpose of command and communication. Each squad is equipped with sufficient transportation to transport the mortars with a minimum gun crew, spare parts, accessories, fire control equipment, and ammunition.

b. Limitations. The use of weapon carriers may be prevented by hostile fires or impassability of terrain.

c. Control. Control of company transport may vary from regimental control to platoon control.

(1) If contact with the enemy is not imminent, company transport may be grouped under regimental control.

(2) In defense, all company transport of the forward mortar platoons, except that required for communication control and ammunition resupply plus designated ¼-ton weapon carriers, will usually be held under regimental control at a selected location in the rear of the battle position.

Section II

TACTICAL EMPLOYMENT OF THE HEAVY MORTAR COMPANY

5. CHARACTERISTICS. The heavy mortar company is capable of little or no independent action. It cannot hold ground long without the assistance of rifle units.

6. MISSION. The mission of the heavy mortar company is to give continuous close support to the rifle companies. This includes protection of flanks, reorganizations, and consolidations.

a. The regimental commander has available to him the fire of three platoons of four mortars each. He can call for the massing of fire on targets in his sector. In the defense, the regimental commander usually will keep the heavy mortar company under regimental control in general support of the entire regiment and will give priority of fires of one or more heavy mortar platoons to each front-line battalion. The heavy mortars deliver fire missions as required in support of the regimental action.

b. Elements of the heavy mortar company may be attached to an infantry battalion when—

(1) The battalion is operating independently.

(2) The battalion gets beyond the supporting fires of its parent unit.

(3) The battalion is on a security mission such as the advanced guard.

c. In the defense, mortars should be located in positions from which—

(1) They can lay heavy concentrations in front of the main line of resistance.

(2) They can fire to support a counterattack.

(3) They can be assigned a barrage plus additional concentrations.

d. Counterattack plans should often include the firing of both HE and smoke.

Section III

RECONNAISSANCE, ORGANIZATION OF FIRES, AND CONDUCT OF DEFENSE

7. RECONNAISSANCE PRIOR TO OCCUPATION OF POSITION IN DEFENSE. *a.* Depending on the time available, the reconnaissance prior to occupation of position in a defensive situation will vary from a detailed study of the ground to a map reconnaissance.

b. Whenever time is available, a thorough ground reconnaissance must be made by the company commander and such other personnel as he desires to have accompany him.

(1) The reconnaissance should cover the foreground of the position to determine areas that can be swept by flat-trajectory fire and those areas which afford covered routes of approach or forward assembly areas for enemy infantry. The reconnaissance of the interior of the position seeks to determine the likely areas of hostile penetration and general locations for mortars and the locations of observation posts. Unless directed otherwise by the regimental commander, the company commander will contact the commanders of each front-line battalion and acquaint himself with their plans for final protective fires in order that he may plan his recommendations for the use of the heavy mortars. At the time he contacts the battalion headquarters he acquaints each with the regimental commander's latest plan for the employment of the heavy mortars.

(2) If time permits, additional reconnaissance should be made to locate accurately the firing position areas, routes

of approach thereto, off-carrier positions, location of the company ammunition supply point, company command post, and company observation post. If time does not permit, much of this reconnaissance may be delegated to platoon leaders after they arrive on position.

8. ORGANIZATION OF HEAVY MORTAR FIRES. *a. Distribution of mortars.* The heavy mortars generally are emplaced 800 to 2,000 yards in rear of the main line of resistance so that minor penetrations will not force them to displace. Their positions should be so located that displacement will not be necessary so long as the regiment continues defensive action within the assigned battle position.
They are distributed, usually by platoon, both laterally and in depth in the vicinity of the reserve battalion. One or more platoons may be attached to the combat outpost initially and may be located in the forward part of the battle position or forward of the battle position. Mortars occupy the best defiladed positions consistent with effective distribution of fires, but should not be located in the more likely avenues of hostile penetration.

b. Mission of heavy mortars. (1) *Long-range fires.* Heavy mortar fires are planned to take the enemy under fire as early as possible, firing against hostile assembly areas and covered avenues of approach. In order to reach out farther and render close support to the combat outpost, some of the mortars initially may be emplaced in forward supplementary positions within communicating distance of the observation located in the combat outpost.

(2) *Final protective fires.* Each platoon is normally assigned a barrage area which measures 100 yards deep by 200 to 400 yards wide. A single mortar may be assigned a barrage area 100 yards deep by 100 yards wide. Barrages are located as close to the main line of resistance as safety will permit (200 yds minimum) and are coordinated with the final protective fires of other weapons in the regimental sector so that the combination of final protective fires will present a continuous curtain of fire across the front of the position.

(3) *Fires within position.* Fires are planned within the position to cover areas of likely penetration.

(4) *Support of counterattacks.* Mortar fires in support of counterattacks are planned to:

(a) Soften up the penetrating force.

(b) Prevent the entrance of additional enemy forces into the penetrated area.

(c) Deny hostile observation with smoke.

c. Designation of target areas. Target areas on which final protective fires are planned are designated as barrages. All other planned fires are termed concentrations. These concentrations are numbered, and are so shown on the squad range card.

9. COORDINATION OF FIRE PLAN. *a.* The company commander assists the regimental commander throughout the development and coordination of the fire plan. During the organization of the position he makes recommendations for such changes in missions or dispositions of weapons as are required by the situation. Choosing the exact locations of primary, alternate, and supplementary firing positions and platoon observation posts; the siting of weapons; and the construction of emplacements are specific duties of platoon leaders.

b. When the fire plan is completed, the company commander submits to the regimental commander a sketch or overlay showing the exact locations of weapons, the locations of observation posts, and the barrages and concentrations. The sketch is drawn to scale and shows areas to be covered by fire.

10. PRIORITY OF TASKS IN ORGANIZATION OF GROUND. *a.* Normally, the priority of work is prescribed by the regimental commander. A suggested priority is as follows:

(1) Digging and camouflaging emplacements and construction of observation posts.

(2) Digging supplementary and alternate emplacements.

(3) Constructing alternate observation posts.

(4) Constructing shelter for personnel not manning the mortars.

b. Work details should be so organized as to permit several of these tasks to progress concurrently. Camouflage is carried on continuously throughout all work.

c. If the defensive is assumed in the presence of the enemy, observation is first assured and mortars are hastily emplaced to give prompt support to the front-line battalions. Later, when the situation permits, the mortars are redisposed and properly emplaced.

11. DUMMY WORKS. Dummy works serve to mislead the enemy and disperse his fire. The general location is prescribed by the regimental commander. They should be constructed where true works might reasonably be located and should bear evidence of an attempt at camouflage. Dummy works which are recognizable as such merely give valuable negative information to the enemy. They are prepared concurrently with other works.

12. ORDERS OF HEAVY MORTAR COMPANY COMMANDER. *a.* After receiving orders from the regimental commander, the company commander issues an order to the platoon leaders. This may be done by—

(1) Assembling platoon leaders at one place for issuance of a complete operations order.

(2) Issuing the operations order in fragmentary form, either orally or by messages to platoon leaders.

(3) Conducting the platoon leaders to the areas their platoons are to occupy and giving instructions on the ground.

b. The order of the company commander covers—

(1) Pertinent enemy information.

(2) Information of friendly troops.

(3) Trace of the main line of resistance.

(4) Primary and supplementary firing position areas and missions to be fired from each position.

(5) Conditions for opening fire in primary and in supplementary positions to include provisions for the protection of mine fields and other obstacles, if required.

(6) Priority of construction of emplacements and measures for concealment and camouflage.

(7) Ammunition supply.

(8) Location of the nearest aid station.

(9) Location of the company command post, location of the company commander, and details of signal communication.

13. HEAVY MORTAR COMPANY OF RESERVE REGIMENT. The heavy mortar company of the reserve regiment may be assigned any or all of the following missions:

a. Long-range fire support of main line of resistance. The heavy mortar company of the reserve regiment may be given the mission of supporting the units on the main line of resistance by fire. The mortar company commander will establish the necessary liaison with the supported unit. He must be prepared to support the reserve regiment when necessary.

b. Fire support for defense areas to be occupied by reserve units. Positions in rear of front-line rifle battalions which serve to block possible penetrations or to prevent the envelopment of a flank are frequently prepared for occupancy. Frequently they are physically occupied by reserve units at all times. On other occasions they are prepared and occupied only on order. The heavy mortar company commander may be ordered to fire in support of such units. He must be prepared to support the reserve regiment when necessary.

c. Support of counterattack. The Heavy Mortar Company commander coordinates with the reserve unit commander in planning the use of his company in case the reserve unit is required to counterattack. This coordination must be done well in advance of any possibility of such counterattack. The heavy mortar company commander of the reserve regiment may be required to support the counterattack of a reserve battalion of a front line regiment as well as a counterattack by the reserve regiment.

14. CONDUCT OF DEFENSE. *a. Actions before enemy attack.* All personnel take cover in emplacements and foxholes during enemy artillery preparations, air attack, or other preparatory fires. Personnel at observation posts

remain constantly on the alert to be prepared to direct the fire of the mortars as soon as targets can be observed. All crews remain on the alert to fire missions on order.

b. Long-range fires during enemy advance. As the hostile advance comes within range, all mortars sited for long-range fires open fire. Targets of opportunity are engaged without delay.

c. Final protective fires. As the hostile attack reaches the area of the final curtain of fire, the heavy mortars may be ordered to fire barrages. Mortars which are occupying supplementary positions for long-range fires but whose primary mission is close support of the main line of resistance are moved to their primary positions in time to perform their primary missions. Final protective fires are released on request or by prearranged signal from front-line company commanders, or by orders of the battalion or regimental commander. Final protective fires may be delivered under all conditions of visibility but generally will not be called for except during poor visibility. If made on call from the front-line elements, they are delivered only by those weapons which support the area from which the call is made and not along the entire line.

d. Antitank defense. When tanks accompany the hostile attack, mortar crews withhold their fires until foot troops near the tanks offer a profitable target. At this time the crews fire at the accompanying troops. Should tanks approach the position, crews lower their mortars to the bottom of their emplacements and take individual cover, and all antitank weapons are brought to bear against the tanks. As soon as the tanks have passed, mortars are mounted and fires are resumed on the accompanying troops.

e. Actions of company commander during hostile attack. The company commander will supervise the activities of his company as well as keep in touch with the regimental commander during a hostile attack. He supervises the conduct of the supporting fires in order to keep both himself and the regimental commander informed and to make necessary changes in fire missions or dispositions.

15. SUPPORTING AN OUTPOST. *a. Support of a combat outpost.*

(1) Combat outposts detailed from one or more of the battalions of a front line regiment cover the foreground of the battle position when the general outpost is at a considerable distance from the main line of resistance, when the enemy prevents the establishment of a general outpost, or when battle is interrupted by darkness or under conditions of poor visibility. The mission of combat outposts is to provide security to the front of the position, or when there are no friendly troops to the front, to perform those duties of the general outpost which their strength and location permit.

(2) Heavy mortars may be located initially in supplementary positions forward of their primary positions to provide supporting fires for the combat outpost and provide close supporting fires to cover its withdrawal. Weapon carriers should be held nearby under cover to insure that mortars may be transported to primary positions in time to fire their primary missions.

16. ANTIAIRCRAFT SECURITY. Advantage is taken of natural features and camouflage, to prevent discovery by hostile aviation of emplacements and other installations. All means are used to defeat hostile aerial photography.

17. MOVEMENT. Due to the weight of the weapon and its ammunition, rapid movement on foot is limited to short distances. For this reason weapon carriers are usually kept near the mortar position under cover, to enable heavy mortars to move as rapidly as other infantry elements.

18. SUPPORTING THE DEFENSE. When defensive positions are occupied for an extended period of time, fortifications and emplacements are improved and fire plans are carefully studied and coordinated. Additional alternate and supplementary positions are prepared and routes of displacement are improved thus gaining a greater degree of flexibility of fires. Communications are expanded by installing intra-platoon and intra-observation post telephone wire, and by laying wire to all supplementary and

alternate positions and observation posts. Large amounts of ammunition are stocked and extensive firing data are prepared.

19. DISPOSITIONS AT NIGHT OR IN FOG OR SMOKE. *a.* At night mortars are laid on their barrages. They may be called upon to fire on any target for which data have been previously computed.

b. Fog or smoke blinds the defenders observation thus creating conditions similar to darkness. Whenever the foreground of the position becomes invisible all mortars are immediately laid to fire their final protective fires.

Section IV

RETROGRADE MOMEMENTS

20. DELAYING ACTION. *a.* Mortar units may be attached to the unit charged with executing a delaying mission. Firing positions must permit execution of long-range fires on the possible enemy approaches and must facilitate withdrawal by carriers. The minimum amount of ammunition necessary to fire the contemplated missions is dumped at the mortar position.

b. The withdrawal of the forward rifle units is usually protected by the heavy mortars engaged in the delaying action. For this purpose the mortars should be attached to the covering force. Mortar unit commanders must select successive rear positions and plan their occupancy so that they may withdraw before capture and move to the rear to occupy the new positions and continue to support the delaying action effectively.

21. WITHDRAWAL. *a. Night withdrawal.* (1) Heavy Mortars in delaying action, less those left with the covering force, are not usually attached to any unit for the withdrawal to the battalion assembly area. In the early stages of the withdrawal heavy mortars may have to be moved by hand. Secrecy considerations will usually prohibit the movement of carriers to advanced positions. The forward limit for carriers will be fixed by battalion orders.

(2) The covering force may include heavy mortars. These are usually single weapons left in position with minimum crews. These weapons conduct fire to simulate normal activity. The battalion or regimental commander will designate the number of mortars per platoon to be left in position. Weapon carriers of each element of the covering force are left with the covering force and are under control of the covering force commander. They should not be used or moved without approval of the covering force commander. Heavy mortar weapon carriers should remain under cover near the mortar positions.

(3) All movements at night are made without lights and unnecessary noises are avoided.

b. Daylight withdrawal. Mortar fires are used extensively to cover the withdrawal of other elements. They may be used under the heavy mortar company commander's control or be attached to the covering force.

Section V

DEFENSE IN WOODS

22. FIRE SUPPORT OF HEAVY MORTAR COMPANY. *a. General.* The fire plan for a defense in woods is the same as for open terrain. Greater reliance must be placed on final protective fires because of lack of observation. Mortars must be located so that they receive adequate rifle protection to prevent their destruction by infiltrating enemy personnel.

b. Clearings. Tree tops are thinned when necessary to permit firing of mortars at any angle of elevation. Thinning must be skillfully executed in order not to disclose the position. Where possible, natural clearings should be used to avoid aerial photo detection.

Section VI

DEFENSE IN TOWNS AND VILLAGES

23. FIRE SUPPORT OF HEAVY MORTAR COMPANY. *a. Fires on approaches.* When the defense is conducted within a town or village, mortar fires are employed to cover

approaches to the defensive position which cannot be properly covered by flat-trajectory weapons or by lighter mortars. Their fires may be used to render frame and light masonry buildings unusable as approaches to the defensive position. They may also be used to cover open approaches to the positions such as streets and alleyways. Final protective fires are planned the same as in the normal defense.

b. Special considerations. Mortars emplaced on hard-surfaced streets, which prevents digging emplacements, are protected by sandbags or other improvised protection. Camouflage is employed. Overhead cover is improvised to give the crew protection from debris falling from nearby buildings.

Section VII

DEFENSE OF RIVER LINE

24. FIRE SUPPORT OF HEAVY MORTAR COMPANY. *a. Regiment on normal frontage.* When a river line is being used as an obstacle directly in front of the main line of resistance and the regiment is defending a normal frontage (2,400-4,800 yds), the fires of the Heavy Mortar Company are planned as on any other comparable terrain.

(1) The main line of resistance may be located on the near bank of the river. In such defense, final protective fires are planned on the river itself or on the far bank, depending on the width of the river and height of the banks.

(2) In order to secure better concealment and better fields of fire, the main line of resistance may be withdrawn slightly from the river and fires planned against probable points of crossing on the far bank. Final protective fires are planned to hold the near bank under fire.

(3) In either of the above cases long-range fires are planned to cover approaches to the far bank. Security forces operate on the far side of the river.

b. Regiment defending wide frontage. When the regiment is charged with the defense of a wide area, as in defensive-offensive action, the near bank of the river may be held lightly by outguards. In such a defense the bulk of the regiment is held mobile, prepared to counterattack or

to occupy any one of several possible defense areas so as to block the attempted crossing.

(1) Mortar platoons may initially be widely dispersed laterally in order to bring immediate fire on any portion of the river.

(2) Routes of movement are planned for all weapons to displace rapidly from initial positions to positions in support of the defense areas to be occupied. Provisions for the protection of the flanks of the regiment are made by preparing supplementary flank positions for designated mortar units.

Section VIII

DEFENSE AGAINST AIRBORNE OPERATIONS

25. DEFENSIVE ACTION OF HEAVY MORTAR COMPANY. *a.* The mission of defending infantry is to destroy parachutists while descending and parachutists and air landing troops who have landed before they assemble their equipment and organize into teams. The commander must so employ his personnel that an attempted parachute landing will be met with surprise by the maximum coordinated fire. This requires a careful plan involving the preparation of alternate emplacements for all-around fire, provisions for rapid alerting of personnel, careful concealment and camouflage of all defensive works, and the distribution of available forces into elements for fixed defense. It also requires the holding of local mobile reserves. Plans must include provisions to prevent firing into friendly troops.

b. Mortar targets include airplanes and gliders on the ground, areas defiladed from flat-trajectory fire in which enemy landings have been observed or reported, or areas in which hostile troops are known to be reorganizing preparatory to an attack.

c. All members of the Heavy Mortar Company not required for operation or control of the mortars participate in fire fights in their immediate vicinity. Unless otherwise ordered drivers remain with their vehicles and operate any automatic weapons assigned their vehicles.

Tactics and Techniques of Small-Unit Fighting in Built-Up Areas

Regardless of the size of the unit employed to attack and reduce a built up area[1] and regardless of the degree of defensive organization accorded the area by enemy forces, the actual battle eventually becomes a series of isolated but related small-unit actions. Squads and sometimes half squads become the unit of measure of firepower as well as the basic maneuver element. Communication between adjacent units becomes increasingly difficult and consequently fires of supporting weapons are more difficult to control. Responsibility for taking objectives within the area devolves upon the squad leader and sometimes upon his assistant. In the heat of very close combat, it is frequently impossible for the platoon leader to direct additional supporting fires for a particular squad without endangering friendly troops. Therefore, control of supporting elements as well as the attacking unit must be decentralized to the lowest possible echelon.

The defender definitely has the advantage during the close-in phase of fighting in a built-up area. He is able to canalize the direction of attack because of the location of buildings, streets, and other man-made features. Further, he can organize the area so that each successive objective from the perimeter to the hub is greater in strength, and thus slow up the attack. If he can maintain several key objectives in the area, the attack will bog down and fail. As a result, fighting in built-up areas is frequently a time

[1]A built-up area is defined as being an area in which man-made construction, designed for habitation and commerce, is predominant; i.e., villages, towns, cities.

consuming process. Only when an overwhelming preponderance of firepower can be directed against specific key objectives can such an area be speedily reduced.

Before considering the problems of a squad or platoon employed in reducing a small part of a built-up area, it is necessary to understand why such a fortified locality must be reduced. The primary reason why a defender prefers to conduct a defense in populated areas is because such a defense will deny the attacker the use of the communications network, roads, railroads, and waterways which pass through the area. Many tactical advantages automatically accrue to a defense so conducted; cover and concealment of a permanent nature can be converted into a strongpoint; obstacles designed to stop armor and infantry are either present or can be built from existing materials; communication facilities are already in existence; routes of supply and evacuation are available; and, most important, the routes of approach into the area tend to be canalized by the presence of buildings located in definite geometric patterns. This canalization, in itself, makes the development of a defensive fire plan relatively simple.

When defended, cities, towns, and villages present formidable obstacles to the attacker. Why, then, attack an area where so many advantages lie with the defender? Why not by-pass the area? The answer lies in the fact that a by-passed village, town, or city is a potential threat to the flanks and rear of military forces engaged in the attack until it is actually reduced. It may be permissible to by-pass such a center of resistance with the leading elements of an attacking force, but a portion of that force must then be assigned to either isolate or clear out the by-passed area. It is advantageous to the attacker to clear out this area as soon as possible in order to relieve the containing forces for other duty; also, in order to prevent the area from becoming a springboard for a counterattack by the defender. Field Marshal Erwin Rommel, German commander of the Afrika Korps, in his actions around Tobruk in North Africa, demonstrated this point rather conclusively. In the middle of April 1941, Rommel launched a successful attack against

the British forces commanded by Field Marshal Wavell. The Australian Ninth Division was bottled up in Tobruk but held out despite repeated attacks. Here Rommel committed a serious blunder by expending time, men, and material in building a forty-mile by-pass road and allowing the British to use Tobruk as a base for badly needed supplies. Six months later in November of 1941, General Auchinleck, who had replaced Wavell, launched an offensive against Rommel from Egypt. An important and perhaps decisive factor contributing to the success of this offense was a coordinated attack made from Tobruk.

In June of 1942, Rommel again initiated an offensive against the British. Having learned his lesson well, he assaulted Tobruk early in the campaign, reduced the area, and continued the attack to El Alamein, deep in Egypt, with the knowledge that Tobruk offered no further threat to his operation.

It can be concluded from this example that the defender should be expected to prepare strategically located built-up areas as centers of resistance, and that the military advantage will rest with him. It is a further conclusion that the attacker must deal with such areas either by encirclement or by direct assault. An encircled area causes the attacker to utilize a large percentage of his available manpower as a holding force and constitutes an ever present threat to the flanks and rear. Therefore, after such an encirclement has been exploited to the greatest degree possible, plans must be made and carried out to completely clear the defended area of enemy. This need becomes urgent if the area is a major communications center.

PHASES OF THE ATTACK

From the viewpoint of the attacker, the attack of a defended, built-up area is divided into two major phases. Phase I is the approach to, and the capture of, an initial position within the edge of the area—in other words, obtaining a "toe-hold" within the periphery of the built-up area, the possession of which will limit the effectiveness of enemy fire and observation. The terrain surrounding the village, town, or city will largely govern the formation

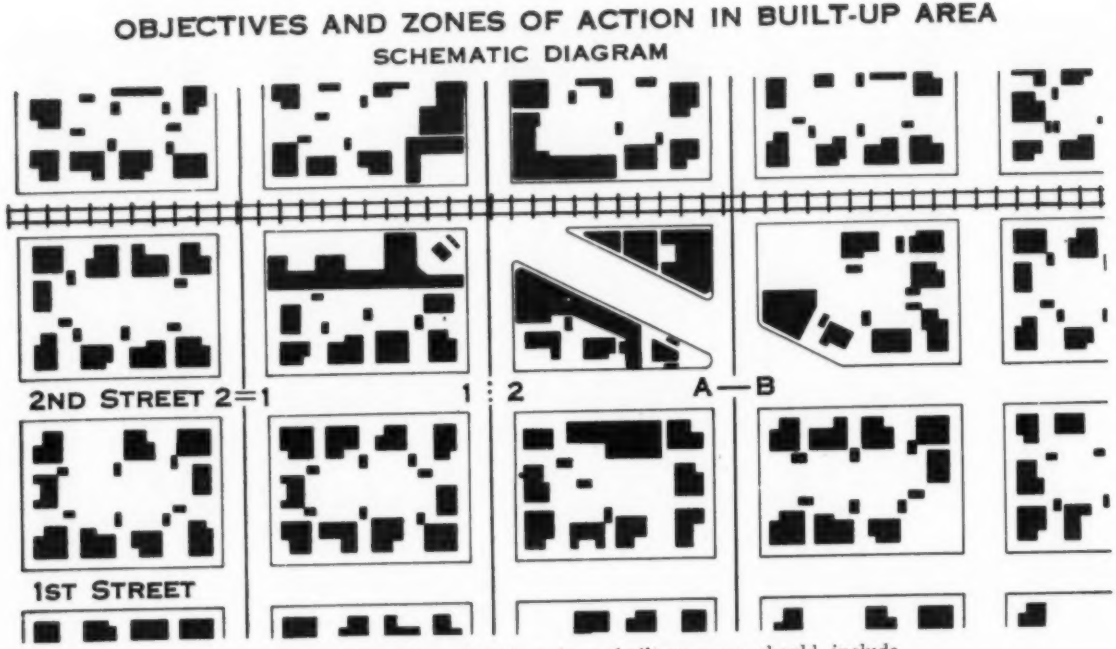


FIGURE 1.—Successive objectives in a built-up area should include roads, railroad tracks, rivers, or other routes of communication.

utilized during the initial attack. No special formation is required for Phase I, although the commander will adopt the best formation possible based on a study of the terrain and known enemy dispositions. The fires of supporting weapons, especially artillery and combat airplanes, should be utilized to the maximum during Phase I. The nature of the defensive works usually offers appropriate targets for direct-fire weapons. Since observation favors the enemy and because his observation post areas are often obvious, smoke can frequently be used to great advantage and may be supplemented by the deliberate incendiary firing of appropriately located structures. Phase II of the attack is the house by house, block by block, reduction of the area and the reorganization and preparation to continue the attack which automatically follows. Phase II begins as soon as possible after the successful completion of Phase I. During Phase II, efficiency of the attacking force will decrease because of difficulties of control, communication, and observation, as the force penetrates progressively deeper into the built-up area. The forces which were engaged in the accomplishment of Phase I may be utilized to accomplish Phase II, or different forces may pass through them to accomplish this mission.

During Phase II, the attacking force tends to become divided into small groups because of the physical presence of buildings, walls, fences, streets, etc. Regardless of the size of the unit engaged in the attack, it is certain that the battle will become a series of small-unit actions involving individual squads and platoons. Knowing full well that this will happen, the attacker must plan for it and, in the final analysis, take advantage of it.

ORGANIZATION

Because of the special type of operation, the rifle squad should be reorganized into two smaller units for fighting in built-up areas. This reorganizatioin does not necessarily conform to hard and fast rules like the Able, Baker, Charlie teams, but is based on expediency. One solution which has proved effective in combat is to organize the squad into an assault party and a covering party. The assault

ORGANIZATION OF THE RIFLE SQUAD
FOR VILLAGE FIGHTING

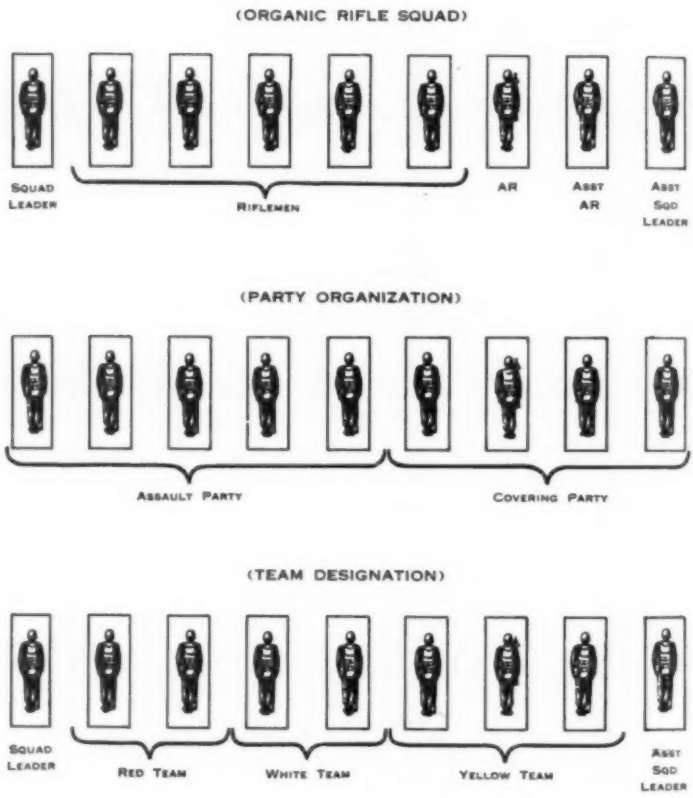


FIGURE 2.—Organization of parties and teams is not static but can be varied to conform to specific situations.

party is composed of the squad leader and the numbers 2 through 4 riflemen. The covering party is composed of number 6, rifleman; number 7, automatic rifleman; number 8, assistant automatic rifleman; and number 9, the assistant squad leader. Although the squad leader directs the action of his entire squad, he personally commands the assault party and he delegates to the assistant squad leader command of the covering party.

The assault party is divided into two two-man teams. Numbers 2 and 3 comprise the first team which should be designated by a definite name such as the Red Team; numbers 4 and 5 comprise the second assault team and are designated the White Team. The covering party, which operates as a unit, is called the Yellow Team. The number 6 man, although initially a member of the Yellow Team, must be prepared to replace any member of the Red or White Teams who may become a casualty. Likewise, the assistant squad leader must be prepared to replace the squad leader and personally command the assault party if the squad leader becomes a casualty.

Control is further insured by the assignment of a series of definite and limited objectives to squads, platoons, and companies, and by the assignment of specific zones of action. Any well defined landmarks such as streets, railroads, rivers, prominent buildings, etc., may be assigned as initial and successive objectives. Since it is virtually impossible for the commander of a unit larger than a squad to retain complete control of his unit after it is engaged in fighting for a certain objective, plans must be made prior to the attack for regaining control as the initial and each successive objective is captured. In addition, plans should be made to utilize each objective as a line of departure so that a coordinated attack on the next successive objective can be launched without delay as soon as the entire unit is ready to continue the attack.

A rifle company engaged in the attack of a well defended built-up area is usually assigned a zone of action not more than two blocks in width and a rifle platoon, not more than

one block in width. These frontages, however, must be construed only as guides for other factors such as the type of enemy resistance, type and density of building construction, width of the entire zone of the parent unit, depth of penetration required, and availability of attacking troops must also be taken into consideration when assigning zones of action.

If the attacker fails to organize his unit into small fighting teams, does not prescribe definite and limited objectives, or assigns subordinate units excessive zones of action, then he is subject to defeat in detail, and control and coordination of the attack is rendered virtually impossible.

CONDUCT OF ATTACK

A platoon normally launches its attack within the village, town, or city with two squads, operating as teams, in the assault and the remaining squad in support. The same factors, however, which dictate the assignment of zones of action will likewise dictate the formation within the platoon. This formation is, of course, subject to change to meet varying battlefield conditions.

The assault, protected by covering fire, is led by either the Red or the White Team, which makes its way forward to the building to be searched and enters. Whenever possible, entry is made from the top of the building and the enemy are cleared from each floor before descending to the next lower level. Outside stairways, drain pipes, lattice work, or ropes may be used to enable the team to gain the roof or upper floors of the building. If it is impossible to enter through the top, entry is made through the ground floor and the team fights its way up the stairs to the top floor. In either case the building is cleared, room by room and floor by floor, from the top downward. By this system, the law of gravity is made to work for the attacker and the adage, "He who commands the heights, controls the depths," is substantiated.

Prior to the entry of the leading man of the team into any room to be cleared, a grenade, either fragmentary or concussion depending on the construction of the building, is thrown into the room or dropped through a hole in the

ceiling. The lead man enters immediately after the explosion and takes position with his back to a wall to cover his teammate who enters immediately behind him to search the room.

After the Red and White Teams clear the building assigned, the squad leader, by means of a prearranged signal, orders his covering party forward. The covering party moves to the captured building and takes up positions from which it can cover the attack of the assault party on the next building to be cleared. This system is repeated until the assigned objective has been captured.

The weapons squad should be utilized to provide close support for assault squads. The LMG team should support the attack by delivering fire against the building(s) under attack until fire is masked. Thereafter, fire should be delivered on other enemy positions which may be covering the building(s) under attack. The squad must displace forward promptly to provide continuous close support to the rifle platoon. The rocket launcher team may be attached to either of the assault squads or may be retained under control of the platoon leader in a central location. The rocket launcher may be used to fire on definitely located enemy emplacements, to screen the advance of assault squads across open areas with smoke, to make openings in the sides of buildings (mouse hole) the doors or windows of which are blocked by debris or covered by enemy fire, and to engage enemy armored vehicles.

Special equipment, such as lengths of rope, toggle ropes, rope carrying rockets, grappling hooks, and ladders are very useful in fighting in built-up areas. If the equipment can be obtained and sufficient time is available prior to the attack to instruct troops in its use, this special equipment provides definite advantages to the attacker. However, rifle troops, provided they have been well trained in the technique of fighting in built-up areas and are commanded by aggressive leaders, can and have, successfully attacked such areas, aided only by their own organic and supporting weapons.

ROLE OF SUPPORTING WEAPONS

Supporting weapons employed to assist units engaged in village, town, or city fighting are used during Phase I, in their normal supporting roles in the normal manner. During Phase II however, these weapons may be attached to platoons, and occasionally to squads, or they may be utilized in direct support. If the weapons are attached, control, and consequently fast accurate fire support, is facilitated. Resupply for the weapons however, becomes more difficult and a part of the attacking unit must protect them. The decision to attach, or place in direct support, any supporting weapon, must be made on the spot by the commander. This decision is based on the factors of control, resupply, and protection.

The attacking force can expect the following assistance from supporting weapons:

1. *Artillery.* During Phase I, artillery should fire concentrations on the built-up area and upon the approaches thereto. Time fire from heavy pieces is very effective against roof top targets and often causes the collapse of the top floors of frame buildings. The quantity of artillery fire placed upon a hostile built-up area is a decision to be made by the commander whose unit is assigned the task of clearing the area. Certain factors must be taken into consideration in arriving at this decision. Among these are—

a. The fact that artillery fire may strengthen emplacements by causing rubble to fall upon them—especially true in the case of pillboxes constructed in basements.

b. The possibility that artillery fire may restrict the movement of tanks and other supporting weapons by causing great amounts of debris or rubble to fall into and block streets, alleys, and other open areas.

c. To a less degree, the attitude of the civilian population, whether hostile or friendly, allied or enemy.

During Phase II of the attack, the effectiveness of artillery fire decreases sharply because of restricted vision and because of the close proximity of the attacking infantry to the target, but it can still be used providing the attacking

troops have adequate cover. Attacking troops may be withdrawn to enable artillery fire to be delivered on a stubbornly defended position, but this measure should be utilized only when other available means have failed. Artillery will rely upon forward observers for adjustment and observation of fire, and these individuals must be well forward with the attacking troops.

2. *Tanks.* During Phase I, tanks will be used to fire on outlying buildings or positions. During Phase II, they are usually attached to infantry platoons to form infantry-tank teams. They are used during this phase of the attack as a self-propelled assault gun firing direct fire, and as an antitank weapon. Tanks must be protected from ambush by infantry and should be well forward during the attack. Rarely, if ever, should tanks preceed infantry in this type of fighting because of the danger of being destroyed by concealed enemy tanks or antitank weapons, and because of the danger of being destroyed or damaged by individual enemy tank hunters.

3. *Mortars.* Mortars, 4.2-inch, 81-mm, and 60-mm, should be used during Phase I to deliver prearranged concentrations. Because of their high trajectory, mortars can be used to advantage during Phase II of the attack to fire on targets which the artillery, because of its flatter trajectory, cannot reach. Normally, 4.2-inch and 81-mm mortars should be used chiefly against roof top targets, using HE shells with instantaneous fuzes; against emplacements in buildings, using shells with delay fuzes; and to destroy buildings by incendiary action, using WP shells. The 60-mm mortars will be of value in providing smoke screens to cover the advance of assault elements across streets, parks, courtyards, or other open areas. All mortars will use forward observers for fire control.

4. *Heavy machine guns.* Initially, these weapons should be used to fire on buildings or other enemy installations located on the outskirts of a built-up area. Thereafter, they should be used to fire grazing fire down streets or alleys. This grazing fire is known as "killing zone" fire and is maintained for the purpose of destroying any enemy

driven into the streets from buildings under attack and to prevent the enemy from using streets and alleys for maneuver, reinforcement, supply, and communication purposes. The weapons are usually attached to the assaulting rifle unit and advance closely behind them by bounds.

5. *Recoilless rifles.* Recoilless rifles, both 57-mm and 75-mm, will be used in their normal supporting role during Phase I. When Phase II commences, the rifles are pushed well forward and attached to, or placed in direct support of, squads and platoons. The rifles are especially useful for firing on embrasures or other firing apertures and on well constructed emplacements. The accuracy and power of these rifles combined with their excellent mobility makes them especially valuable to the attacking forces. The weapons may be fired from hallways, wrecked buildings, large rooms, or from the open, but in selecting a firing position for the rifles, their peculiar back blast must be taken into consideration and room provided for dissipation of the back blast.

6. *Flame Throwers.* Either portable or tank-mounted flame throwers may be utilized by the assault troops. They are especially useful in destroying enemy troops located in basements, culverts, caves, or pillboxes. They are also useful in the reduction of street barricades.

SUMMARY

An intelligent enemy may be expected to defend built-up areas and develop them into centers of resistance since many advantages over the attacker are gained by such a defense. The attacker may initially by-pass this area but he must clear it eventually in order to protect his flanks and rear and release troops for other missions.

Once the attack is launched, the attacking unit tends to become separated into smaller groups and the attack becomes a series of small-unit actions. To prevent loss of control and to insure that all of the small-unit actions are coordinated and directed toward the common objective, definite and limited objectives are assigned and squads are subdivided into special parties and teams. The success of

PRINCIPLES GOVERNING THE ATTACK OF A BUILT-UP AREA

1. *Do not fight in the streets as they are usually covered by fire.*
2. *Decentralize control to small units.*
3. *Designate definite and limited objectives.*
4. *Make no movement without covering fire.*
5. *Follow assault elements closely with support elements.*
6. *Coordinate closely with supporting weapons.*
7. *Surprise the enemy and avoid being surprised.*
8. *Realize that observation and fields of fire are limited.*
9. *Realize that the movement of mechanized vehicles is restricted.*
10. *Realize that within the built-up area, close support by combat aviation and artillery is limited.*
11. *Realize that communications are impeded.*
12. *Realize that the supply problem becomes more difficult as the attack progresses.*

the attack as a whole will depend primarily on the degree of training of the teams and the agressiveness of the small-unit commanders.

Through a thorough understanding of the problem involved and by thorough preparations for solving the problem, well disciplined, trained infantry squads can, by the use of their own organic and supporting weapons, attack and clear a well defended, built-up area. Special equipment, however, may be extremely useful provided it, and the time required to instruct troops in its use, is available.

Excessive casualties and defeat are the inevitable result of the failure of the attacking commander to recognize the special problems posed by an intelligently defended built-up area, and his corresponding failure to adequately solve the problems.

Duties of a Division G-4

Outstanding among the many lessons learned or relearned during the prosecution of World War II is the fact that logistics is of prime importance; movement of troops and supplies to the critical point at the critical time is, and will continue to be, the dominant factor in conducting a successful campaign. Conversely, loss of ability to move troops and supplies also entails loss of initiative and limitation of action which finally results in defeat.

Over forty per cent of the military forces involved in World War II were employed to provide logistical support for field forces, excluding service personnel organically assigned to combat units. And even in our present uneasy "peacetime," whole national groups of peoples are fighting diplomatic meeting engagements, employing as weapons their intangible resources such as radio, political dogma, financial resources, and scientific knowledge. Furthermore, behind this nebulous battle line these groups of nations are marshalling the tangible resources at their command, such as coal, iron, oil, and food. It is obvious, even to the superficial observer, that any future war will undoubtedly call into play every atom of the resources available to our nation, and that all these resources must be channeled directly into their most useful function at the outset if we are to attain the victory essenial to our own national survival.

Since it is the division G-4 who acts as one of the valves near the end of the supply pipeline through which the food, fuel, and ammunition flow to the fighting man, it is essential that every officer know and understand how the G-4 and his assistants should function.

The personnel assigned to the G-4 section of the infantry division are the G-4, two assistants, a warrant officer, and four enlisted men. The actual organization of the office

is left to the discretion of the G-4 and varies among divisions. In general, however, it is possible to divide the work of the office into broad categories of operational duties and administrative duties. One method of organization is to charge the G-4 with operational duties, such as the allocation of supplies or the location of installations, while one assistant G-4 handles administrative tasks such as the G-4 worksheet or the administrative order. The other officer and the warrant officer may be designated to handle transportation. The enlisted men are used to further the operations of the office as a whole and are not subdivided into separate sections.

Comparing the duties of G-4, which are shown in figure 1, with the personnel assigned to the office, it is apparent that the G-4 can never allow himself to become an operator in the supply business. He must, instead, be the coordinator of logistics within the division. Stated in another way, he employs the technical services of the division to accomplish the operational part of the supply, evacuation, transportation, and maintenance for the division, focusing his attention on the *coordination* of the operations of these services into one cohesive plan. This is true because, as has been pointed out, the G-4 lacks adequate personnel to conduct operations, and in addition, because he probably lacks the detailed knowledge necessary to run the whole show. Furthermore, trained personnel are included within other divisional organizations to perform specific operational duties incident to supply.

A good G-4, then, coordinates the operations of the special staff officers of the division in order to execute approved plans and policies. To do this, he obtains the recommendations of special staff officers and assembles their separate recommendations into one workable plan by ironing out all the differences of method or opinion. This plan is then coordinated with all the other staff sections, and after it has been approved by the division chief of staff, the G-4 issues the necessary instructions or directives to the services who will carry it out. This does not relieve the G-4 of responsibility for the proper operation of the plan, and he

DUTIES OF A DIVISION G-4

SUPPLY:
- Determines requirements
- Distributes supplies
- Develops standards for new items
- Collects salvaged and captured materiel

EVACUATION AND HOSPITALIZATION:
- Controls with respect to men and animals

TRANSPORTATION:
- Governs for units, personnel, and supplies by land, air, or water
- Movement and traffic control
- Operation of movements (with G-3)

SERVICES:
- Requirements, allocation, and movement of service troops
- Construction of facilities and installations
- Maintenance and repair of facilities
- Sanitation
- Maintenance and repair of supplies
- Real estate
- Fiscal activities except payment of troops and civilians
- Property accounting
- Recommendations as to training of service troops (coordinates with G-3)
- Other activities of technical services

MISCELLANEOUS:
- Unit rear boundaries (coordinates with G-3)
- Rear echelon of Division Headquarters (coordinates with G-1)
- Lines of communications (coordinates with G-3)
- Civil affairs supplies
- Planning future operations
- Orders
- Reports
- Records of supply matters

FIGURE 1.

must make the necessary checks to insure that the approved plan is being carried out. But the actual operations must be performed by the services which are equipped and trained for this purpose. After the division has operated together for a time, much of the detailed procedure becomes routine, and is published to the command through the medium of Standing Operating Procedures (SOP). If the G-4 performs his duties in this fashion, his office will not be as overworked and undermanned as might at first appear to be the case. And if he organizes his work properly, he should be able to distribute the operating details to the technical services in such a manner that he has adequate time to study plans for the future.

The principle staff officers with whom the G-4 will work are shown in figure 2. The general staff officers are termed the coordinating staff, since their primary function is the coordination of separate recommendations into an integrated plan, which, when approved by the chief of staff, is executed under the cloak of the commander's authority.

As a simile, this coordinating staff may be compared to four families living on the same street. Although each has its own family problems, all might be served by the same milkman or postman, protected by the same policeman, and abide by the same laws. In the same manner, each general staff section may be served or assisted by any or all of the special staff sections.

The second line shows the special staff sections with which G-4 will work most frequently. Each comes to the G-4 with suggestions or recommendations and the G-4 assists each with whatever means he may have, or helps to obtain other means. In turn, each service helps the G-4 section by carrying out a particular part of the administrative plan. The important point to remember is that G-4 is not a commander, and he does not interfere with the internal operation of the services, but he must coordinate their operations for the benefit of the division as a whole.

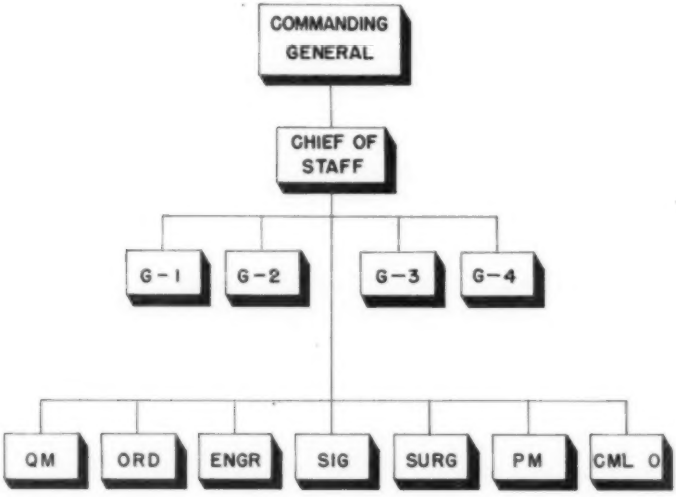


FIGURE 2.—Coordination of all staff functions is effected under supervision of the chief of staff.

Having discussed the staff relationships of G-4 in a general way, it is necessary to examine these services briefly to determine what each is able to accomplish in the logistical support of the division.

The division quartermaster commands all quartermaster troops in the division. The Quartermaster Company is commanded by a captain and is divided into a Supply Platoon, Truck Platoons, a Field Service Platoon, and a Division Quartermaster Office Section. This company provides the personnel which perform quartermaster supply and maintenance for the division. The Truck Platoons provide the bulk of the transportation which is available for moving supplies other than ammunition. The Field Service Platoon operates the salvage collecting point, the graves registration service, and laundry and bath units.

The division ordnance officer commands all ordnance troops in the division. The Ordnance Maintenance Company is commanded by a captain, and includes two Maintenance

Platoons and a Supply Platoon. Other ordnance elements are the Division Ordnance Office Section and the Division Ammunition Office (DAO) Section. The division ordnance officer establishes and supervises the operation of the Division Ammunition Office, the function of which is to *control the delivery of ammunition* to units of the division. Ordnance items of issue are supplied through the Supply Platoon. The Maintenance Platoon provides maintenance for the vehicles, tanks, and weapons of the division.

The division engineer commands the Engineer Combat Battalion. In addition to their primary function of repair of roads, construction of bridges, execution of demolitions, and performance of other engineering tasks, the engineer battalion supplies engineer items of issue, including fortifications material and establishes and operates water supply points for the division. (Although four such sets of water supply equipment are organic equipment, the battalion normally establishes only three water supply points throughout the width and depth of the division zone, keeping one spare set for replacement purposes.)

The division signal officer commands the Division Signal Company, although the T/O provides that this command may be delegated. In addition to its primary duty of construction and maintenance of the signal communications network of the division, the Signal Company issues and maintains items of signal supply for the division.

The division surgeon is a special staff officer of the division. He makes the necessary recommendations to G-4 regarding the location of the Division Clearing Station, or other medical installations, and medical matters including sanitation. The Medical Battalion, which is commanded by another medical officer, is the operating element which provides the necessary facilities for evacuation and hospitalization. The battalion obtains and issues medical items to units of the division through medical channels.

The provost marshal commands the Military Police Company and is responsible for preparing recommendations for the traffic control plan, assists in traffic and movement

control, and may be called upon to provide some of the protection for lines of communication with which G-4 is charged. The provost marshal also works closely with the G-1 in the enforcement of law and order, and instructions given him by the G-4 should be coordinated with the G-1.

The division chemical officer has a small section of two officers and four enlisted men. He advises the G-4 on matters of chemical corps equipment and supply.

In coordinating the operations of the technical services the G-4 must observe sound principles. One of the most important of these is that the impetus of supply must be from rear to front. This permits combat unit commanders to focus most of their attention on fighting the battle while supply agencies *push* the supplies up close behind the fighting troops. (The Navy, in describing their supply system, states that it should follow the force system, not the suction system. This is another way of stating that supply troops in rear pump the supplies forward for the commander, rather than requiring the commander to suck them forward from behind.) This principle, however, can be dangerous if the commander fails to make his needs known. The commander fighting the battle is the best judge of his own requirements, and must keep the supply agencies informed of what he will need, and when, so that they may be pushed up to him in time. While this is only common sense, it is sometimes overlooked.

After the needs of the commander are determined, the G-4 converts these needs into quantities of items, or requirements, and establishes a level of supply which will enable the unit to function properly without excesses. This reserve level of supply must be kept at a bare minimum in order not to immobilize the division with supplies which are not necessary. To meet the necessity for larger reserve stocks, army establishes supply points close behind the divisions, usually in the corps zone, where division obtains its supplies for day to day needs. To accomplish this forward flow of supplies, G-4 must coordinate the supply procedures in the division, establish the necessary schedules, and make a plan for supply which will insure delivery of supplies to

the right place at the right time. In addition, G-4 must control the functioning of this system, keeping a watchful eye for possible break-downs or sudden peak loads. He also maintains the necessary records and submits the necessary reports to his superiors so that they are kept abreast of his problems. Above all, he must make plans well in advance, and must make them so that they are flexible enough to meet changing conditions in the tactical situation.

The two methods employed in distributing supplies in combat are supply point distribution and unit distribution. The primary difference between these two methods lies in which unit furnishes the transportation to carry the supplies forward. In supply point distribution units use their own transportation to go to the supply point and pick up their supplies. In unit distribution the higher unit delivers supplies to the using units. The method normally used in the infantry division is supply point distribution, unit distribution being employed when units are unable to pick up their supplies, or for other special reasons.

The methods of supply employed in the infantry division must be simple, flexible, and direct. In general, each of these systems of supply may be divided into a channel of requisition, which flows upward; a channel of delivery, or distribution, which flows downward; and, where necessary, a control channel which normally follows the command chain in both directions.

The supply system for Class I supply is illustrated in figure 3. The control system for Class I supply is not illustrated because is consists simply of the publication of schedules, through command channels, of the time when subordinate units will pick up rations at the supply point. The army quartermaster publishes a schedule showing when divisions will pick up rations, and the division quartermaster in turn publishes a schedule to units of the division through the G-4.

The basis of the request system is the ration return, which is submitted daily by units, showing the number and type of rations they need. These unit ration returns are consolidated by the division quartermaster and forwarded

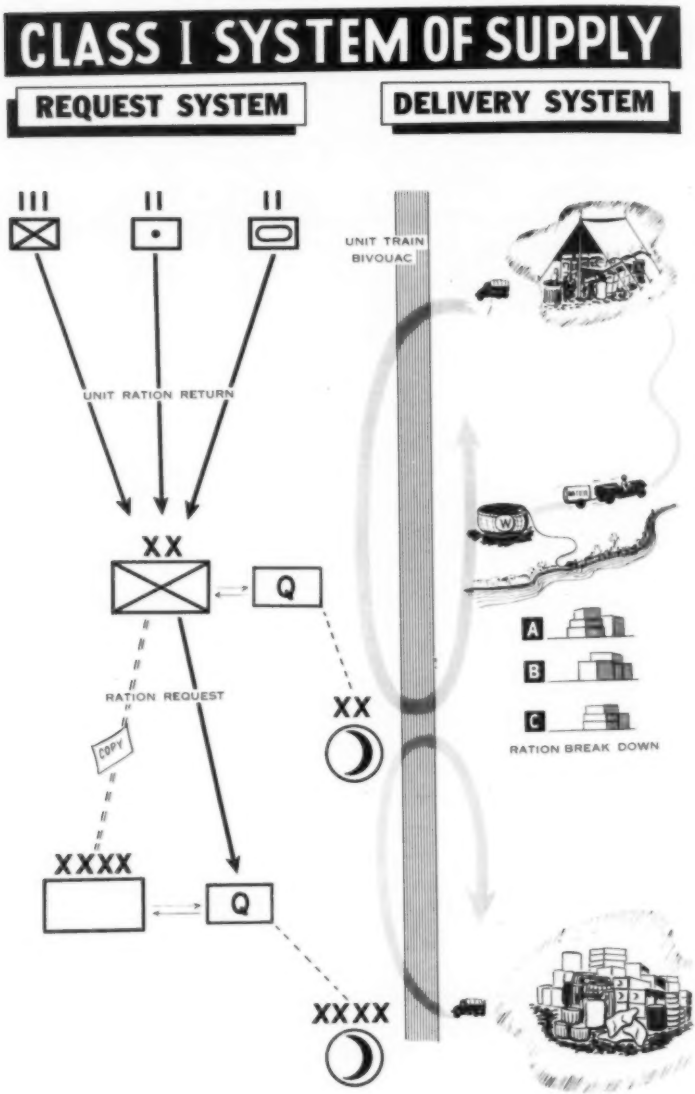

CLASS I SYSTEM OF SUPPLY
REQUEST SYSTEM
DELIVERY SYSTEM
III
II
II
UNIT RATION RETURN
XX
Q
RATION REQUEST
COPY
XXXX
Q
XX
XXXX
UNIT TRAIN
BIVOUAC
A
B
C
RATION BREAK DOWN

FIGURE 3.

through the G-4 to the army quartermaster operating the supply point supporting the division. Personnel operating the army Class I supply point prepare the rations for issue, and issue them on schedule to the division in bulk.

The delivery system is simple. The division quartermaster dispatches trucks to the army supply point where the rations are picked up and returned to the division area. There, the rations are broken down for units of the division and picked up by transportation from the units for delivery to unit train bivouacs.

Water for the division is supplied from water supply points established throughout the division area which are convenient to the using units. Units then send water trucks to pick up water as needed. No requisition is required.

The duties of G-4 in connection with supply of Class I items are to coordinate with the quartermaster in the preparation and publication of the schedule of delivery at supply points, to coordinate the ration requirements with the G-1 as to the amount of rations required, and to coordinate with G-3 as to the type of rations. G-4 usually establishes the reserve level which will be kept on hand by the division quartermaster, in accordance with instructions of the division or higher unit commander. G-4 also furnishes the necessary information to the quartermaster for the preparation of the unit ration request.

The supply system for Class III is illustrated in figure 4. The control system for Class III is to replace empty cans with full ones on a direct can-for-can exchange basis. When Class III items are rationed, additional controls may be imposed, but the direct exchange system is the most common control.

The request system for Class III items is based on daily status reports, or reports of expenditure, submitted by units. The status report is a report of the quantity on hand at a specified time, while the expenditure report shows the quantity expended during a specified previous period. This information is consolidated by the division quartermaster and forwarded to the army quartermaster through

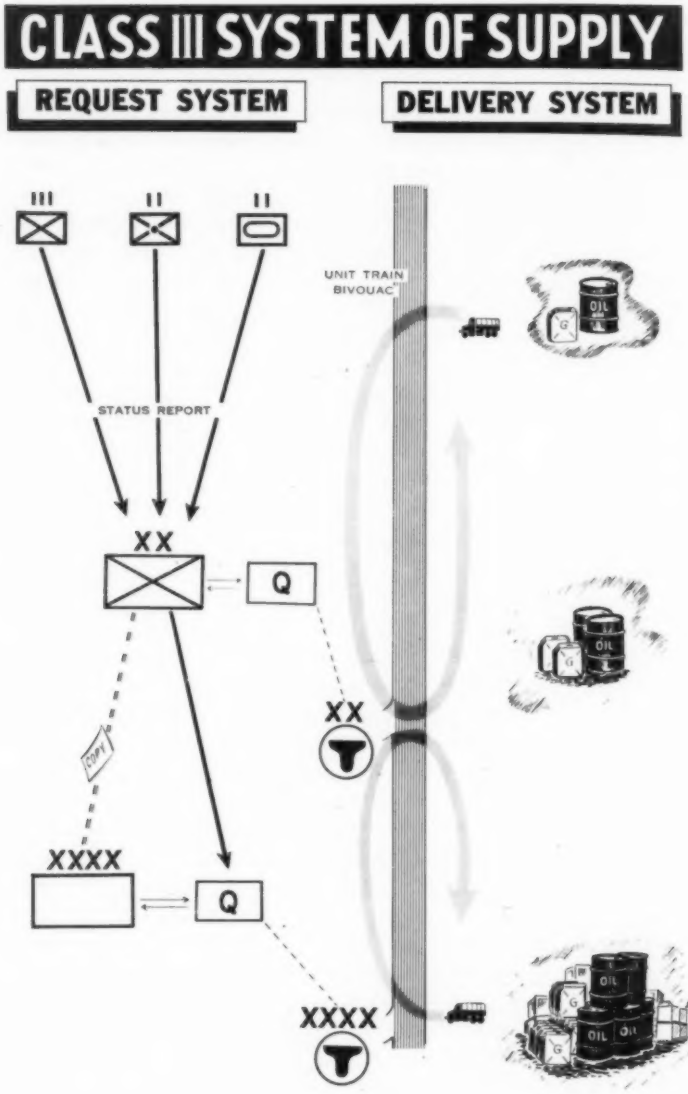

CLASS III SYSTEM OF SUPPLY
REQUEST SYSTEM
DELIVERY SYSTEM
III
II
II
UNIT TRAIN
BIVOUAC
STATUS REPORT
XX
Q
XX
XXXX
Q
XXXX
OIL

FIGURE 4.

the division G-4. The army quartermaster then makes the amount thus requested available at the Class III supply point supporting the division.

The delivery system normally operates by units dispatching transportation to the army supply point and picking up their needs on a direct can-for-can exchange basis. Subordinate units of the division may dispatch trucks direct to the supply point to pick up gasoline as required, the only requisition necessary being an empty gasoline tank or can. Loaded trucks return from the army supply point direct to their unit train bivouac, from which point gasoline is issued to vehicles of the unit. A similar system is used when the division operates a Class III supply point; the division quartermaster picks up the gasoline for the division in bulk, returns it to the division area, and requests units to pick up their needs at the division Class III supply point. The division quartermaster normally maintains a reserve supply of 4,000 gallons of gasoline at the quartermaster train bivouac for use in case of emergency.

The duties of G-4 in connection with Class III supply include coordination of requirements with the G-3, furnishing the quartermaster with the necessary information to prepare his request to the army quartermaster, indicating any special requirements, and prescribing the necessary control measures when Class III items are rationed.

The system of supply for Class V is illustrated in figure 5. The control system for Class V consists of allocations of ammunition which flow downward through command channels, and of reports of expenditure, which flow upward. Since ammunition often represents the heaviest tonnage load on the supply system, and because it may vary from almost nothing during lulls in the fighting to peaks during heavy attacks or preparatory bombardments, a close control of ammunition expenditures is almost mandatory. Allocations of ammunition come down to the division G-4 from corps headquarters. They are usually expressed as credits in number of rounds available at the army ASP. The G-4 does not normally break these credits down but

exercises control by limiting expenditures of ammunition and limiting stockage to a level necessary to maintain prescribed loads. Further control is accomplished through the system of daily unit reports of expenditures which are consolidated by the division ammunition officer and forwarded through the G-4 up the chain of command.

Requests for ammunition are made as needed to replace prescribed loads. When a unit needs additional ammunition, the munitions officer makes out a request and sends trucks to the rear to pick it up. The request is carried to the Division Ammunition Office by a representative of the unit munition officer. This request, when signed, becomes a transportation order on the Army ASP stocking the ammunition needed. The representative then rejoins the convoy and guides them to the proper ASP where the trucks pick up the ammunition needed. Thus, the request system and the delivery system are both accomplished in the same cycle of events. Loaded ammunition trucks upon their return from the ASP, go to unit ammunition supply points, where the ammunition may be trans-loaded to lighter vehicles for further movement forward, or held mobile.

The reserve of ammunition carried by the division consists of the prescribed loads of the ammunition vehicles of the division. For this reason, whenever one of the ammunition vehicles is emptied by trans-loading for delivery to forward units, or loads are dumped on the position in defensive situations, these vehicles immediately go to the rear for new loads so that the prescribed loads are maintained intact at all times.

The function of G-4 in supervising the Class V system is to determine special ammunition requirements in close coordination with G-3, and to break down the division ammunition allocation to subordinate units. In addition, he furnishes the Division Ammunition Office with the necessary information and instructions to enable them to carry out their task, and supervises their operation. In this connection, it must be remembered that the functioning of the Class V system is of paramount concern to the G-4 since it is a well-known fact that although a soldier

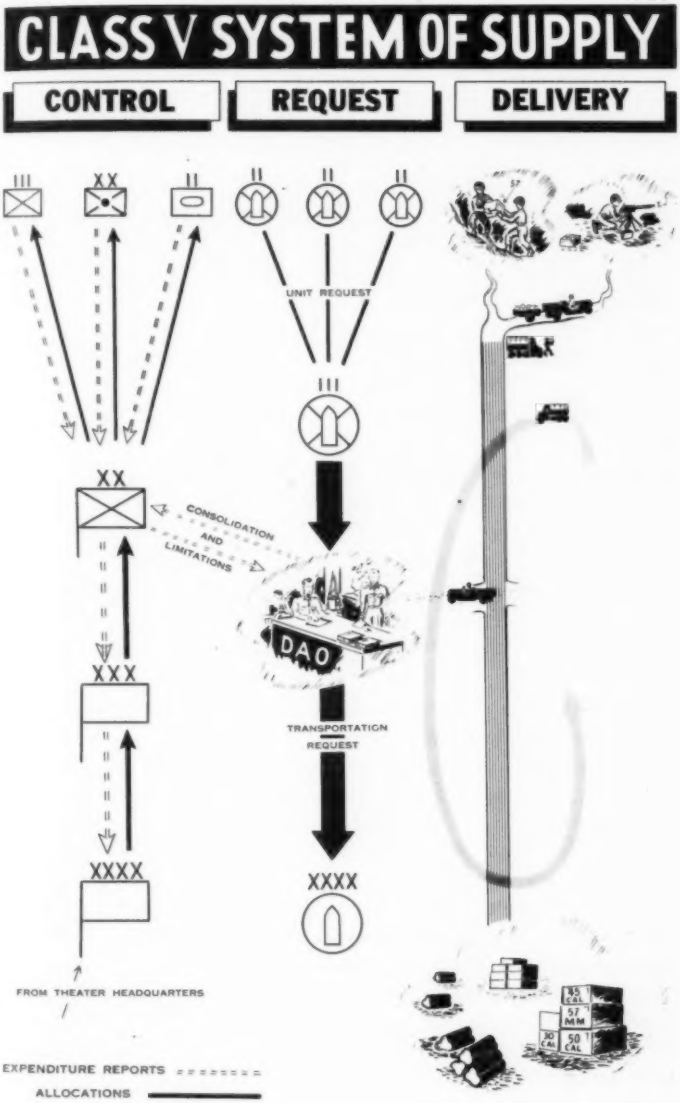

CLASS V SYSTEM OF SUPPLY
CONTROL
REQUEST
DELIVERY
UNIT REQUEST
CONSOLIDATION AND LIMITATIONS
DAO
TRANSPORTATION REQUEST
FROM THEATER HEADQUARTERS
EXPENDITURE REPORTS
ALLOCATIONS
105 CAL
57 MM
30 CAL
50 CAL

FIGURE 5.

may be able to fight for a while without food, and may march when he has no gasoline, no amount of will to fight can enable him to fire his weapon when he has no ammunition.

Class II supplies, or items of T/O&E, are supplied by direct requisition on supply services. Items such as radios, arms, wire, and other equipment are usually issued on a direct request basis, these requests being consolidated by the division G-4 and requisitioned on the depots in rear. Division transportation picks the items up at the proper supply points in the army area and issues them to subordinate units on a replacement by item basis or on a report of expenditure in battle action. Items such as clothing are requisitioned periodically and issued on an established schedule. Many of these items are replaced by direct exchange of a worn out item for a serviceable one.

The duties of G-4 for the supply of Class II items are the determination of requirements, close coordination with all the other staff members, advance planning for items such as winter clothing, the control of issues so that waste does not occur and that salvageable items are recovered, and the establishment of a workable system of requisitioning and delivery schedules.

The supply of Class IV, or special items, such as waterproofing materials for amphibious operations, or mountain climbing equipment, are obviously a matter of advance planning, because the need for these items must be foreseen in time to make them available for issue when the tactical situation demands. Careful estimates must be made months in advance so that the supplies will be available for issue when requisitioned by units. The need for fortification materials, bridging, mines, etc., must also be foreseen in time to permit the delivery forward of these items when they are demanded by the situation. These are usually handled in a manner similar to that used for Class V items, being allotted to subordinate units and hauled forward on unit transportation.

The duties of G-4 for the supply of Class IV items require careful study to determine requirements well in

advance, to control issues, to maintain adequate records as a basis for future requisitions, and to coordinate the supply requirements with the G-3 and other members of the staff.

Evacuation and hospitalization for the infantry division is carried out by the Division Medical Battalion operating under the supervision of the division surgeon. The function of G-4 in this system is to coordinate the operation of the system with the other parts of the logistical plan by approving the plans made by the surgeon, keeping the surgeon informed of contemplated actions or changes in plans, and by coordinating supply and evacuation matters with the G-1 and G-3. G-4 assists the surgeon by providing the necessary transportation and by furnishing common items of supplies.

Transportation within the division is provided by vehicles organic to the units of the division. The control of transportation, however, is a big G-4 problem. Almost every after action report of the past war comments on the fact that transportation was not adequate. Since the supply of transportation will seldom meet the demands put upon the system, transportation needs must be closely coordinated through the G-4 office with the entire command. Troop movements are coordinated through the G-3; the flow of supplies is regulated through the technical services, and traffic control is carried out by the provost marshal. In order to insure that the maximum amount of transportation is available at all times, the G-4 must keep a watchful eye on the maintenance picture within the division and must keep an accurate record of availability. This function is carried out through the ordnance officer, who is responsible for the bulk of vehicle maintenance within the division, through the various unit transportation officers, and the quartermaster who controls the bulk of the general purpose vehicles in the division.

Services within the division are provided by the technical services organic to the division. G-4 coordinates the operation of these technical services to provide tools, spare parts, and other items through the technical service chan-

nels. These items are normally drawn direct from supply depots in the army area. In addition, each special staff officer makes the necessary recommendations to G-4 for the most effective employment and use of items peculiar to his service.

Sanitation within the division area is carried out by the division surgeon according to plans approved by the G-4, who requisitions the supplies and makes the necessary personnel and equipment available for the purpose.

Maintenance of arms and equipment, accomplished by the appropriate technical service, is divided into three echelons: organizational, field, and base maintenance. Organizational maintenance is that maintenance of equipment which can be done by the organization itself using tools and mechanics available at the unit level. Field maintenance is provided by the next higher echelon in the chain. Within the division, field maintenance is provided by the technical service concerned. Vehicles, weapons, and tanks, for example, are maintained by the Division Ordnance Maintenance Company, while radios are maintained by the Division Signal Company. Each technical service has its own maintenance unit within the division. Items which these small units cannot repair due to lack of trained personnel or heavy maintenance equipment are sent to base shops in the communications zone for what is logically termed base maintenance.

Real estate requirements, such as land for bivouac areas, buildings for storage or hospitals, and the like, are handled by the G-4 using the services of the division engineer, who makes the necessary surveys and recommendations. G-4 coordinates all of these requirements, allots space to units, and, in cooperation with the finance officer and the judge advocate, makes the necessary financial and legal arrangements for use of the property.

G-4's functions with respect to property accountability and responsibility are carried out by publishing proper and adequate instructions to subordinate units, and through supervision of subordinate unit operations and procedures. To enforce these instructions, he must make the necessary inspections and establish adequate record systems.

Miscellaneous items handled by G-4, including the designation of rear boundaries, main supply routes, the location of the rear echelon of headquarters, and civil affairs, are accomplished in close coordination with other interested staff officers.

Planning also appears on the list of miscellaneous duties, but this must not belittle its importance. It is extremely important to remember that the G-4 must plan well in advance, that he must keep himself and his operating units abreast of new plans or proposed changes, and that he must prepare his requirements to meet these changes in a timely manner. The G-4 must look into the future occasionally—not in the manner of a crystal ball gazer, but in the manner of one who has studied past operations of his own and other units, and, reckoning from that basis, can foresee what his unit will need with reasonable accuracy and plan to have the necessary supplies on hand when they are needed. Blind stabs in the dark or random guesswork in the requisition of supplies, will result only in needless waste, while failure to foresee the need for special equipment or peak loads of supplies, may result in a useless loss of lives or even loss of the battle itself.

To facilitate his planning, G-4 must prepare and keep current a careful estimate of the situation including all the known factors and make due allowance for the items which may become critical or subject to change. Based on this estimate, G-4 must plan the overall system of control of the logistical operations of the division. This control system is implemented by requiring necessary reports. These reports should be simple and should be submitted on a regular schedule so as to distribute the work load evenly on all concerned. Only those reports which are necessary should be called for, and they should not be requested automatically as of midnight on Saturdays. This means that the man in the lower echelon has to prepare all of these reports at one time and work his staff far into the night to get them in on time. It also means that the work load in the G-4 office will hit a peak on Monday morning. A better method is to call for reports on a planned schedule so that each falls into a

pattern thus distributing the work of preparation, consolidation, and forwarding. From these unit reports the G-4 keeps the necessary records which should reflect the current supply status in all items which will reflect trends and will permit the detection of incipient trouble spots in time to correct them before they develop further. Finally, the G-4 must insist that reports be kept to the minimum necessary, and that the keeping of records does not delay the issue of supplies to the point where subordinate units would rather go without an item or make a "moonlight requisition" than fight the battle of the typewriters with the higher echelon.

Merrill's Marauders

(An Historical Monograph)

Between December 1941, and May 1942, the Japanese Armies engulfed the Philippines, Dutch East Indies, the Malay Peninsula, much of Oceania, and almost all of Burma. The conquest of Burma threatened the precarious Allied position in India, cut the last overland supply route to China, and posed a serious threat to communications between the United States and Australia.

The strategic situation in Burma remained static until the spring of 1943 when an Indian Infantry Brigade under Maj Gen (then Brigadier) Orde C. Wingate (British) crossed the natural barrier between India and Burma and engaged the Japanese in a series of harassing operations. The success of this long-range-penetration operation was the basis for the decision made at the Quebec Conference in August 1943, to organize a similar American unit to participate in the Burma offensive scheduled to open in 1944.

Five months after the Quebec Conference the 5307th Composite Unit (Provisional) was organized, fully equipped, trained, and ready for long-range-penetration operations in Burma. Primarily infantrymen, personnel of the unit were recruited from the jungle-trained, jungle-tested, combat divisions in the South and Southwest Pacific, and were the only American ground combat troops designated at this time, for the China-Burma-India Theater. The unit was composed of three battalions commanded by Brig Gen Frank D. Merrill and soon became popularly known as *Merrill's Marauders.*

Each battalion was divided into two balanced combat teams for jungle operations. Each team contained approximately one-half of the rifle, heavy weapons, and administrative elements. This communications, personnel, and equip-

ment were equally divided so that the teams could maintain contact with each other and either team could contact the rear base by radio, control air supply drops, or maintain air-ground communication. The battalion commander retained command of both combat teams but divided the staff personnel so that the executive, with a skeleton staff, could assume command of one of the teams.

ORGANIZATION OF THE 5307TH COMPOSITE UNIT (PROVISIONAL) TO APRIL 1944

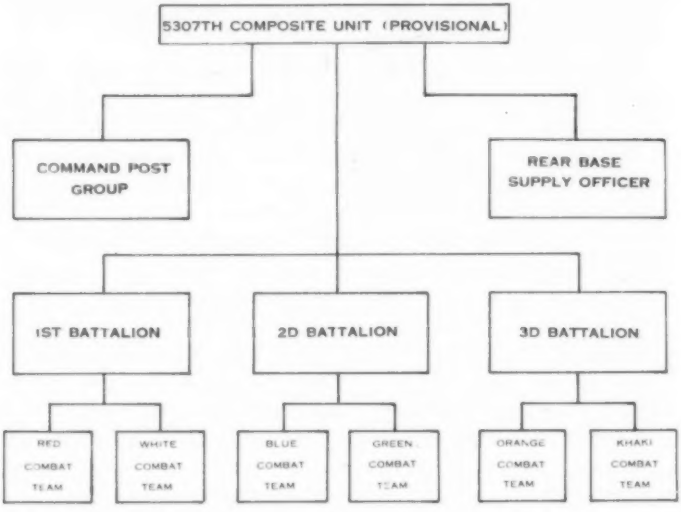


FIGURE 1.—Organization of the 5307th Composite Unit.

The long-range-penetration mission of the Marauders prevented utilization of normal methods of supply; food and ammunition were to be supplied entirely by air-drops. Means were provided for reliable radio communication between the isolated units and the rear supply base where highly-trained Air Force and supply personnel were prepared to

fulfill the supply requests on a moments notice. By the same token, the jungle units were assured adequate air-support by attainment of the closest cooperation between air and ground forces. The supply base was located at Denjan, 32 miles west of Ledo. Here standard units of each category of supplies based on estimated requirements for the battalion for one day were packaged ready for delivery. Requisitions were submitted on a basis covering daily needs, or were readily adapted to this basis.

TERRAIN

In North Burma, the terrain alone is a formidable barrier to movement of troops as it is a country of numerable large and small streams, dense jungles, and sharp hills and mountains. Native footpaths and the narrow ruts of cart tracks are the only routes of communication throughout 95 per cent of the entire area of approximately 5,000 square miles. From the western slopes of the Patkati range with their characteristic rain forests of trees towering 80 to 100 feet before the branches meet in a dense roof of foilage over a floor of rotten vegetation 3 to 4 feet deep, to the typical jungle of the Hukawng lowlands, almost impenetrable because of the rank growth of underbrush, vines, bamboo thickets, and swamps bordered with marshes of Kunai (elephant) grass 4 to 6 feet high, the area presents major difficulties to even small military units. The climate is detrimental to military operations being a tropical monsoon area with extremely heavy rainfall varying from 150 to 250 inches in the western and southern portion, to 75 and 100 inches in the north. Average mean temperatures are 60 degrees low, and 90 degrees high, from October to February. During the period from March to June the weather is excessively hot and humid.

MISSION

In January 1944, the 5307th Composite Unit was taken from British control and placed under the command of General Stilwell, Commanding General, China-Burma-India Theater. Shortly thereafter, having completed a three month period of intensive training and maneuvering with

British long-range-penetration units, the 5307th was moved by train and river boat to the Indian railhead at Ledo.

For some months the Chinese 22d and 38th Divisions under the general supervision of General Stilwell had been locked in a bitter stalemate with the Japanese 18th Division in the foot hills of Northern Burma, near Shingbiwang. The mission of the 5307th was to operate in the rear of the

FIGURE 2.—Area of operations.

Japanese forces and prepare the way for the southward advance of the Chinese by disorganizing enemy supply lines and communications. The 5307th was thus assigned a key

role in the drive to recover northern Burma, and clear the way for the construction of the Ledo Road which was to link up the Indian railhead at Ledo with the old Burma Road to China.

From February to May 1944, the operations of the 5307th Composite Unit (Prov) were closely coordinated with the movements of the 22d and 38th Chinese Divisions. In five major and thirty minor engagements they met and defeated the veteran soldiers of the Japanese 18th Division— climaxing with the capture of Myitkina Airfield, the only all-weather air strip in northern Burma. This was the final victory of the 5307th Composite Unit (Prov) which was disbanded in August 1944.

Of particular interest from a tactical standpoint, is the second mission of the Marauders. This mission involved careful coordination between Chinese units, the supporting air arm, and detachments from the Office of Strategic Services. The plan for the second mission was as follows: Marauder columns located some 6-8 miles N. E. of Walawbum were to strike simultaneously at points along the Kamang Road and establish road blocks, pinch out hostile elements between these blocks, and then strike north and south along the road as the situation warranted. To insure maximum freedom of action for the Marauders and to exploit their advances, two regiments of the Chinese 38th Division were to take part in the operation. Following the Marauder units, these Chinese troops were to take over the blocks as soon as they were established, enabling the Marauders to exploit the situation freely as it developed.

The 1st Battalion composed of Red and White Combat Teams followed by a Chinese Regiment and the 6th Chinese Pack Artillery, was to proceed in a 60-mile flanking movement to cut the road in the general vicinity of Shaduzup. The 2d and 3d Battalions, also followed by a Chinese regiment, were to make a wider sweep of about 90 miles to block the Kamang Road in the vicinity of Inkangahtawng. It was estimated that the Marauder columns would take about two weeks to get to the road.

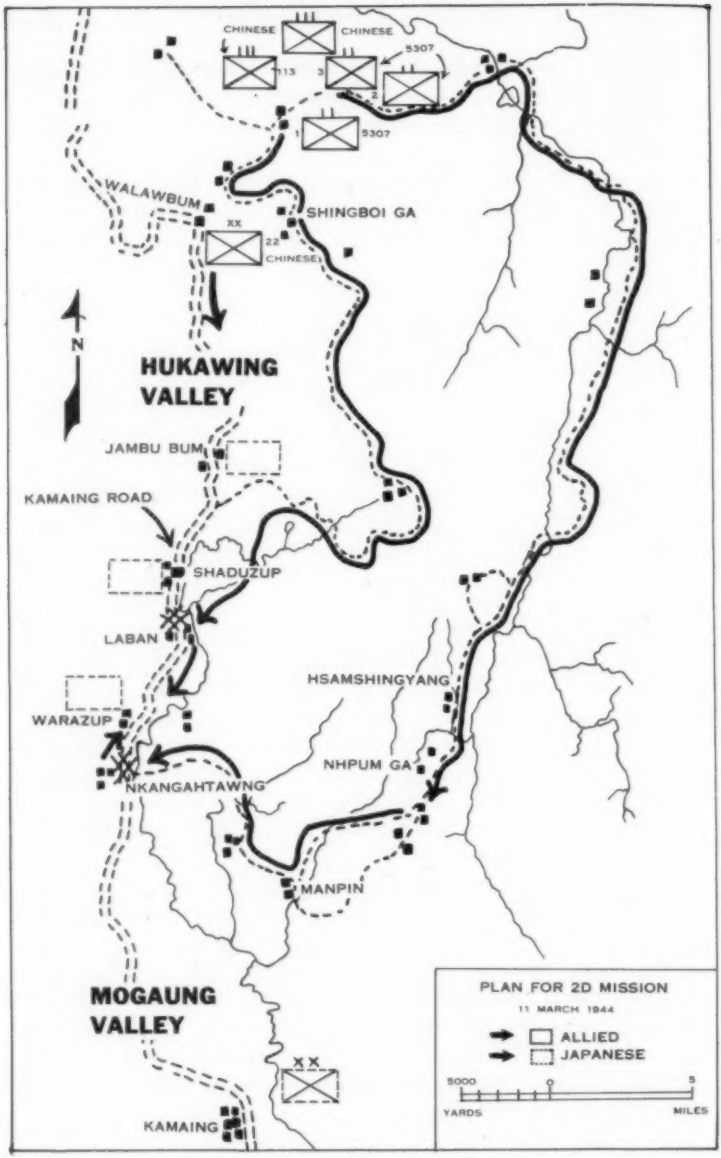


FIGURE 3.—Plan for the second mission.

At 0400 on the 10th of March 1944, two sections of the Intelligence and Reconnaissance Platoon of the White Combat Team, 1st Battalion, moved out for Shaduzup, 3 hours in advance of the main column. The mission of this reconnaissance unit was to select bivouac and supply-drop areas and to watch for any kind of enemy patrols. The 1st Battalion with attached units began moving at 0700. The terrain was fairly rugged, and as the unit was moving very cautiously, it covered only ten miles or so a day for the first two days. The third day, the column began to climb and soon was in territory which ranged about 4,000 feet altitude, and the difficulties of progress were increased by the tendency of trails to avoid stream beds and to follow ridge lines.

At about 1045 on the morning of 12 March, the lead scout of the I & R Platoon noticed some queer looking hobnailed footprints in the trail and evidence of a small body of men having camped by a small stream (i.e. cans, old fires, "Va. City" cigarette packages). Due to the fact that radio silence was being observed, the platoon leader dropped a messenger back to the unit following to pass on this information. At 1600 hours on the same day the first enemy contact was made. Following the Japanese foot prints, the I & R Platoon was able to surprise a group of Japanese sitting in the trail. The Marauders killed four Japanese and one Burmese and wounded a number of others in the initial burst. The main column which had picked up the messenger, hearing the firing in the distance, made all haste to come to the assistance of the reconnaissance unit.

With the aid of one of the rifle platoons from the main column the I & R Platoon was successful in driving the Japanese across a small stream, the Tinkrung River, and from the high ground which dominated the stream on the south. Here the battalion bivouacked for the night, and the next day, with a rifle platoon spearheading the advance, fought eight separate skirmishes within the first one and one-half miles. Delaying tactics of the Japanese company caused the battalion commander to make a decision to bypass the Japanese force as time was pressing. The movement was very difficult and every man, including officers,

took his turn cutting trail. At some points bamboo was so thick that it was necessary to cut it off at ground level and again at a height of about six feet, creating a sort of tunnel through the jungle. It took two days of back-breaking labor with kukris and machetes to reach Kumsham Ga, a distance of only 4 miles.

When the 1st Battalion reached Kumsham Ga on the afternoon of 17 March, supplies were needed. While the request for an air drop was being radioed back (SCR 694) to the supply base in India, the Marauders picked the best available spot in the mountainous area and cleared it for a dropping field. However, in locating this field, the transports consumed so much time that their gasoline supply was dangerously low. The pilots, therefore, advised the Marauders that they would make the drop next morning and returned to base. The Marauders improved the field and when the planes returned the following day the drop was made. Because of the hills encircling the drop ground, the transports had to unload from a high altitude and much of the free-dropped grain (dropped without parachutes) was lost. Some of the parachutes containing ammunition floated over a nearby hill, but all were eventually searched out and their loads secured.

As soon as the supplies were packed, the 1st Battalion pushed forward vigorously over the trail leading south, and by nightfall of 18 March had reached a point 2 miles northwest of Jaiwa Ga. Here it made contact with 50 Kachins operating under an OSS officer, who provided guides for the rest of the march to Shaduzup. Because the I & R Platoon had been conducting intensive patrolling for several days, it was given a short rest by being placed back in the main column.

The next point of enemy resistance was reached on 20 March, when the battalion entered Nprawa. As the lead scouts were plodding along the trail, their Kachin guides suddenly became talkative. Having no interpreter at hand, the Marauders nonchalantly ascribed the natives "jabbering" to a desire for food or cigarettes and provided the Kachins with both. Actually, the Kachins had announced

that a Nambu (Japanese machine gun) position lay directly ahead, and they assumed that the food and cigarettes were rewards for this information. The machine gun soon disclosed itself, killing one Marauder and wounding two. Luckily the Japanese were too hasty in opening fire on scouts; had they waited, more men would have been caught by their ambush. Within an hour the 1st Battalion's mortar fire forced the enemy to withdraw. This incident taught the Marauders a lesson; thereafter, remarks made by the natives were always interpreted.

On 21 March, the battalion stopped to pick up a 5-day supply drop in a rice paddy near Ktingnankawng. After recovering the drop, they proceeded to reach Hpauchye Ga with Red Combat Team in the lead. After clearing this village located only five miles east of the Kamaing Road, reconnaissance elements determined that every trail was blocked or ambushed. The advance platoon of the Red Combat Team ran into ambush, and at first tried to push through or bypass the enemy positions. As the platoon was cutting a trail around a trail block, the scouts sighted a Japanese group lounging beside well-made foxholes. The Marauders crept forward cautiously and opened fire, killing seven Japanese. When the Americans took over the foxholes for a brief rest, the enemy returned in greater force and attacked them. The foxholes were so well located that the Marauders were able to break up the attack quickly, inflicting additional casualties on the enemy. However, further reconnaisance revealed no trail open to the Kamaing Road. In order to preserve an element of surprise for the establishment of the block near Shaduzup, the battalion commander considered it highly important for his battalion to have as little contact with the enemy as possible. Therefore, he again decided to leave the well-guarded trails and cut a path southward, cross country, from Hpauchye Ga toward the Chengun River.

During the next 2 days, 23 and 24 March, the advance was strenuous and difficult. Time and again the men gained passage through the almost impenetrable growth only by slowly hacking out a path. Rain began to fall.

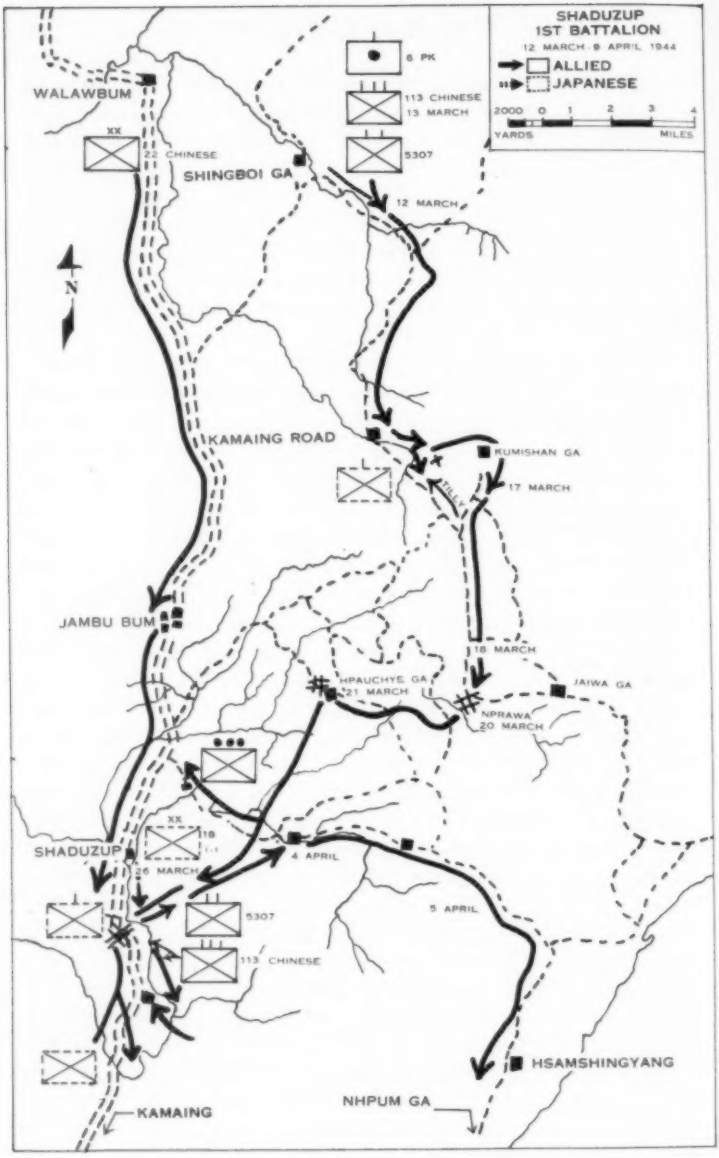


FIGURE 4.—Operations from 12 March to 9 April 1944.

Frequently they had to unload the pack animals and carry the supplies by hand up steep hillsides. The battalion was successful, however, in maintaining secrecy of movement, for during the 5-mile cross-country move, the Marauders met no Japanese.

From OSS reports, the battalion commander learned that the enemy held Shaduzup in some strength. Four hundred Japanese were estimated to be there, and five to six hundred more in the vicinity of Jambu Bum, six miles to the north. In order to decieve the enemy and avoid being attacked by a combined enemy force, the battalion commander decided to send one platoon to make a feint toward Shaduzup from the northeast. The main battalion column was to proceed down the Chengun River to Kamaing Road.

Following this decision, one rifle platoon was sent along a trail running northwest to Hakahki Gahtawng. Just before entering this village the platoon surprised two enemy soldiers, evidently a reconnaissance party, carrying only maps and sketching equipment. Both of these men dropped as the Marauders fired, but a moment later one of them leaped to his feet and disappeared into the underbrush. The platoon passed on through Hakahki Gahtawng. The village soon afterward became a mortar target for the Japanese, who continued to throw shells at it throughout the night. This feint to the north undoubtedly contributed to the complete surprise achieved the next day by the 1st Battalion's arrival to the south of Shaduzup.

The battalion commander had decided to place his road block where the Mogaung River makes a U-bend in confluence with the Chengun River. At this location approximately 4 miles south of Shaduzup, the river runs parallel to the road. On the night of 26 March, the 1st Battalion bivouacked by the upper reaches of the Chengun River. Next day the Marauders, wading downstream to avoid the enemy, made their way south to within a mile of their objective.

The I&R Platoon which had again been pushed to the front, reported Japanese present, apparently in large numbers, some bathing in the Mogaung River and others grenading fish. Also, there appeared to be an enemy camp between the Mogaung River and the Kamaing Road. Further scouting revealed that at least one Japanese company was installed in this camp and that there was another and larger camp a short distance to the south. The enemy had quantities of food and clothing stored in bashas or under canvas covers.

FIGURE 5.—Wading down the Chengun River, the Marauders were able to move to within one mile of their objective without detection.

Still confident that the Japanese were unaware of the Marauders' presence, for even the advance platoon had

not been discovered, the battalion commander planned a surprise night attack, to begin early on 28 March. He selected three points for crossing the Mogaung River and organized the battalion into six columns for the attack on the northern Japanese camp. Three columns were to converge upon the camp; three others, closely following the first three, were to be sent either to add impetus to the shock wherever resistance might be met, or to fill any gap that might develop in the lines. The second three columns could also, if necessary, be used for flanking operations or to meet any supporting enemy force that might be rushed up from the southern Japanese camp.

The White Combat Team formed the three columns making the first attack. At 0300, with the combat team commander leading, the team started out in complete silence and cautiously waded the Mogaung River. Red Combat Team took position on the east bank to cover the south flank of the attacking force. The Chinese 113th Regiment was in reserve.

The Japanese were caught completely by surprise. Not one sentry was encountered as White Combat Team's three columns crept into position. Dawn broke. Small fires began to crackle in the unsuspecting Japanese camp as early risers started to prepare breakfast.

Suddenly the attack order was given by radio. With fixed bayonets the Marauders swept through the camp. Naked or half dressed, the panic striken Japanese scattered in all directions. Those with weapons fired wild, ineffectual shots. Many of them were killed or wounded by bayonets, grenades, and tommy guns.

A rifle platoon was the first unit to reach the Kamaing Road, and the men immediately dug a protective perimeter which constituted the road block. When the perimeter was finished, the men changed into clean underwear which they had found in a captured enemy truck, and devoured the rice and fish that had been left cooking over the enemy's breakfast fire.

The expected counterattack was not long in developing. By 0700 Japanese snipers were very active, and further

digging in, although not discontinued, became difficult. By 0900 Japanese artillery opened up on Red Combat Team on the east bank of the river.

Preliminary reconnaissance parties had not discovered that the enemy had artillery. White Combat Team's perimeter was so close to the rise in ground behind which the enemy gun positions were located that, for the time being, they were masked and not a vulnerable target. By 1000, however, the Japanese managed to get another battery from farther north ranged in, and soon 77 and 150-mm shells came pouring down on the perimeter.

The stab by the 1st Battalion at the rear of the Japanese seriously diverted their attention from the Chinese 22d Division advancing down the road from Walawbum. After several consecutive attacks, the Chinese had reached Jambu Bum at the threshold of the Mogaung Valley, a few days before the Marauders established their road block below Shaduzup, 10 miles to the south. (See figure 4.) Enemy troops were hurriedly pulled back along the road to help cope with this new threat to their rear, thus permitting the Chinese to make more rapid progress against slackening Japanese resistance.

Caught between these allied forces, the Japanese made determined efforts to extricate themselves. By mid-day White Combat Team's perimeter had undergone an attack from the north which was turned back with heavy losses to the enemy. At 1300 another attack, supported by artillery, developed from the west, and reinforcements were arriving in trucks from the south. But by this time the Marauders had an excellent final protective line which the Japanese were unable to penetrate. All that afternoon the enemy attacked in varying strength, nearly always from a different quarter, and each time the Marauders repulsed them after inflicting heavy casualties.

The assaults tapered off in late afternoon, but all that night enemy artillery pounded both the road block and Red

Combat Team's position across the river. Since the Marauders had no artillery, they used their mortars and threw grenades whenever they heard a suspicious sound along their front.

The Marauders had established themselves firmly. Following the plan of operations, the Chinese 113th Regiment moved just before dawn of 29 March and took over both the road block perimeter and the supporting positions along the east bank of the river. When the Chinese opened up with their pack artillery, the enemy guns quieted down. By 1000 the 1st Battalion had withdrawn about a mile up the Chengun River to a Seagrave hospital unit which had been set up during the last two days. The weary Marauders rested, while listening to opposing Chinese and Japanese artillery fire from just over the hill. The action on the Kamaing Road had cost the 1st Battalion eight men killed and 35 wounded.

By 29 March the Japanese had lost more than 400 men south of Shaduzup, and during the day they withdrew toward Kamaing. One battalion of the Chinese 113th Regiment followed the retreating enemy as far as Laban, approximately a mile to the south. At 1500 patrols from this Chinese Battalion met patrols from the Chinese 22d Division pushing down through the Hukawng-Mogaung corridor, and the Kamaing Road was declared open to Laban.

General Merrill's instructions to the 1st Battalion had been to rejoin the rest of the 5307th Composite Unit, which would probably be near Hsamshingyang, as soon as practicable after accomplishing the mission. This order was confirmed when the 1st Battalion received a message to proceed to Janpan by easy stages.

The shortest route for the 1st Battalion from Shaduzup to Janpan was directly across the western chain of hills in the Kumon Range to the Tanai Valley (see figure 4). Movement was started on 30 March. The trail became increasingly rugged as the men backtracked along the Chengun River and headed for the ridges rising east of the corridor to 2,000, 3,000, and sometimes 4,000 feet. In a day's march of 10 hours they sometimes covered little more than a mile.

From 1 to 3 April, the 1st Battalion was out of contact with headquarters. A sack of grain, falling from a supply plane during an air drop, had crashed into the unit's only long-range radio putting it out of operation. On 3 April, the battalion commander was unwilling to wait any longer to hear from General Merrill and returned to Shaduzup, where the Chinese headquarters had a radio net with the Marauder headquarters. While the battalion commander was gone, the battalion's radio operator succeeded in repairing his machine, and simultaneously the Chinese and battalion radios picked up an urgent message from the General directing that the 1st Battalion make all haste to Hsamshingyang, where reinforcements were desperately needed. The 1st Battalion proceeded toward Hsamshingyang, traveling only 14 miles the first 2 days. On 6 April, a message contained in the late afternoon supply drop stated that the 2d Battalion was encircled at Nhpum Ga, and that the 3d Battalion was engaged in heavy fighting to extricate it; both battalions were in a critical position.

On 7 April, the 1st Battalion reached Hsamshingyang with 30 per cent of the men incapacitated by dysentery. Only 250 men were available the next morning for the joint attack to break the Jap siege of the 2d Battalion at Nhpum Ga.

The attack was preceded by an artillery and mortar barrage, followed by a dive bombing-strafing attack. All elements moved into position at 0930 as planned, with the 3d Battalion Khaki Combat Team attacking the Japs along the trail; Orange Combat Team proceding in a flanking movement along the mountain slopes east of Nhpum Ga; the 1st Battalion circling to the west in an effort to divert the enemy from the rear, south of the perimeter.

In the first hour or so, only about 50 yards were gained but by later adjustment of the barrages to Jap strong-points, the total advance for the day was extended to 300 yards. Khaki Combat Team received the brunt of the opposition, being forced to attack up-hill, along the thicket-choked trail. Three dead Japs along this trail had been using M1 rifles and one was wearing GI jungle boots. Lead scouts reported

that the Japs were retreating 50 or 60 yards up the trail to prepare positions during artillery-mortar barrages and returning to their weapons when fire lifted. After reporting this, the scouts picked off four Japs on their way back to their positions when the next barrage was lifted.

All the elements of the 1st and 3d Battalions launched an attack just after dawn the following day, Easter Sunday, 9 April. The advance into the beseiged 2d Battalion perimeter was entirely unopposed. The Japanese had fled during the night. From appearances of former Japanese positions it was evident that their departure was disorganized; equipment and supplies were abandoned, and in some areas, rice was still stewing over fires. It is probable that the appearance of the 1st Battalion at the Japanese flank and rear may have been the decisive factor leading to their rapid withdrawal during the night.

SUMMARY

It would be stretching the point a bit to cite the"lessons learned." Few indeed were the lessons learned, the principles of which had not been stressed time and again during training. But in this phase of the Marauder Campaign, certain basic principles of battle were re-emphasized.

That the first battalion commander gambled on several occasions in order to achieve the secrecy which resulted in surprise to the enemy is not questioned. Had the battalion been detected in the closing stages of its march to Laban as it was moving down the bed of the Chengun River, it could easily have been ambushed and, possibly, all but annihilated. However, this gamble paid off as shown in the results of the battle for Laban.

Again, due to the denseness of the jungle, contact with the enemy was restricted to a comparatively small number of men at any one time. *Consequently, most of the fighting was carried on by squads and platoons at relatively close range.* Such situations demanded the utmost in *aggressive, small-unit leadership.* This factor, beyond all doubt, was the most important single item contributing to the success of the mission.